VALAHIA UNIVERSITY OF TARGOVISTE
FACULTY OF ELECTRICAL ENGINEERING, ELECTRONICS AND INFORMATIONAL TECHNOLOGY
AUTOMATION, INFORMATION AND ELECTRICAL ENGINEERING DEPARTMENT

SYLLABUS

According to the curriculum 2021-2022

1. Information about the program

1.1 Higher education institution	**Valahia University of Targoviste**
1.2 Faculty/Department	**Faculty of Electrical Engineering, Electronics and Informational Technology**
1.3 Department	**Automation, Information and Electrical Engineering Department**
1.4 Domain of study	**Electrical Engineering**
1.5 Cycle of study	**Master**
1.6 Studies program/Qualification	**Integrated Electrical Systems Engineering in Vehicles**

2. Information about the discipline

2.1 Name of the discipline				**Vehicles principles and architecture**			
2.2 Owner of the courses				**Associate professor Ioan Corneliu Salisteanu**			
2.3 Owner of the tutorial classes				**Associate professor Ioan Corneliu Salisteanu**			
2.4 Year of study	I	2.5 Semester	I	2.6 Type of evaluation	E	2.7 Status of the discipline	Compulsory

3. Estimated total time (hours of academic activities in a semester)

3.1 Number of hours in a week	3	of which: 3.2 course	2	3.3 tutorial class/sem	1
3.4 Total of hours in the curricula	42	of which: 3.5 course	28	3.6 tutorial class/sem	14

Distribution of the effective time	hours
Study according to manual, course support, bibliography and notes	10
Additional documentation in the library, on specialized electronic platforms and in the field	14
Tutorial class preparation/labs, homework, papers, portfolios and essays	10
Tutela	10
Examinations	4
Other activities	10
3.7 Total hours of individual study	**58**
3.9 Total hours in a semester	**100**
3.10 Number of credits	**4**

4. Preconditions (if case)

4.1 of curriculum	LET 1 B F 10– Physics (Mechanics) LET 1 B F 02 – Mathematics LET 1 B D 08 – Electrical Engineering Elements LET 1 B D 15 – Electrical Engineering 1 (Electricity and Magnetism) LET 2 B D 03 – Electrical Engineering 2 (Circuit Theory)
4.2 of competences	Theoretical Electrical and Mechanical Engineering, Physics, Mathematics

5. Conditions (if case)

5.1 for course development Regular course classroom (25 places, video projector)
5.2 for tutorial class/project development Regular course classroom (25 places, 15 computers)

6. Specific cumulated competences

Professional competencies	**C1.1** Theoretical concepts regarding vehicles integrated electrical systems, vehicle principles and architecture, materials used to manufacture them, environmental impact, cooling or heating of electrical components. **C1.3** Capability of thematic documentation, identifying the existing situation and requirements and interpreting previous achievements. **C1.5** The ability to analyse multiple alternative methods or solutions for choosing the most advantageous techno-economic compromise. **C1.6** The description based on mathematical models, of the vehicles integrated electrical systems operation, together with the justification for the choice of materials used for their manufacture, the manufacturing technologies, the modes for cooling or heating the electrical components and the impact on the environment. **C2.4** Critical analyses to highlight the advantages and the competitiveness of new solutions of integrated electrical systems developed in relation to the existing offers on the market **C6.1** Theoretical and applied concepts of Systems Engineering for the vehicle industry. **C8.4** The ability to evaluate complex problems and to communicate demonstratively the results of their own assessment.
Transversal competencies	CT1 Identifying the requirements, resources, processes, deadlines and risks necessary to prepare the execution plan and to carry out the professional and organizational tasks in compliance with the ethical norms agreed by the society. CT3 Self-control and planning of training needs, efficient use of information and communication resources, and assisted training (Internet portals, specialized software applications, databases, on-line courses, etc.) to meet the personal career development plan.

7. Purposes of the discipline (according to the specific cumulated competences grid)

7.1 General purposes of the discipline	The overall objective of the course is to deepen knowledge of the solutions for modern mobility and transportation systems mainly represented by Electric and Hybrid Electric Vehicles.
7.2 Specific purposes	• To introduce students in mobility and transportation present and future solutions. • To provide knowledge of vehicles principles and architecture (Conventional Vehicles, Electric Vehicles, Hybrid Electric Vehicles, Plug-In Hybrid Electric Vehicles, Fuel Cell Vehicles). • To introduce students to the tools and methodology associated with modern transportation technology. • To provide students with experience in identifying and analyze systems and block components of vehicles within the context of multi-domain automotive systems.

8. Contents

8.1 Course	Teaching method	Observations
Modern Solutions for Sustainable Transportation	Presentation of the concepts and interactive lecture.	3 hours
Conventional Vehicles Basics (Systems and Block Components of a Conventional Vehicle, Vehicle and Propulsion Load, Drive Cycles and Drive Terrain, Wheel Slip Dynamics)	Presentation of the concepts and interactive lecture.	3 hours
Electric Vehicles (EV) Basics (Principle of EV, Systems and Block Components of EV, Vehicle and Propulsion Loads)	Presentation of the concepts and interactive lecture.	3 hours
Hybrid Electric Vehicles (HEV) Basics (Principle of HEV, Systems and Block Components of HEV, Vehicle and Propulsion Loads)	Presentation of the concepts and interactive lecture.	3 hours
Plug-In Hybrid Electric Vehicles (PHEV) Basics (Principle of PHEV, Systems and Block Components of PHEV, Comparison between the PHEV and HEV)	Presentation of the concepts and interactive lecture.	3 hours
Fuel Cell Vehicles (FCV) Basics (Principle of FCV, Systems and Block Components of FCV, Issues Related to Fuel Cells)	Presentation of the concepts and interactive lecture.	3 hours
Advanced HEV Architectures and Dynamics of HEV Powertrain	Presentation of the concepts and interactive lecture.	4 hours
Advanced EV Architectures and Dynamics of EV Powertrain	Presentation of the concepts and interactive lecture.	4 hours
Special Vehicles and Applications	Presentation of the concepts and interactive lecture.	2 hours

Bibliography:

1. Chris Mi, M. Abul Masrur, David Wenzhong Gao - HYBRID ELECTRIC VEHICLES, WILEY, 2011
2. Sanna, L. - Driving the Solution – the Plug-in hybrid Vehicle, 2005
3. Masrur, M.A. - Penalty for fuel economy – system level perspectives on the reliability of hybrid electric vehicles during normal and graceful degradation operation. IEEE Systems Journal, 2 (4), 476–483, 2008
4. Varga, B.O., Mariasiu, F., Moldovanu, D., Iclodean, C. - Electric and Plug-In Hybrid Vehicles, Springer, 2015
5. Mehrdad Ehsani, Yimin Gao, Ali Emadi - Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design, Second Edition (Power Electronics and Applications Series) 2nd Edition, CRCPress, 2009

8.2 Tutorial class/sem	Teaching methods	Observations
Conventional Vehicles Principles and Architecture	Concepts recap, debate, dialogues, problem solving	2 hours
Electric Vehicles Principles and Architecture	Concepts recap, debate, dialogues, problem solving	2 hours
Hybrid Electric Vehicles Principles and Architecture	Concepts recap, debate, dialogues, problem solving	2 hours
Plug-In Hybrid Electric Vehicles Principles and Architecture	Concepts recap, debate, dialogues, problem solving	2 hours
Fuel Cell Vehicles Principles and Architecture	Concepts recap, debate, dialogues, problem solving	2 hours
Calculus and Solving of HEV Problems	Concepts recap, debate, dialogues, problem solving	2 hours
Calculus and Solving of EV Problems	Concepts recap, debate, dialogues, problem solving	2 hours

Bibliography:

1. Chris Mi, M. Abul Masrur, David Wenzhong Gao - HYBRID ELECTRIC VEHICLES, WILEY, 2011
2. Sanna, L. - Driving the Solution – the Plug-in hybrid Vehicle, 2005
3. Masrur, M.A. - Penalty for fuel economy – system level perspectives on the reliability of hybrid electric vehicles during normal and graceful degradation operation. IEEE Systems Journal, 2 (4), 476–483, 2008
4. Varga, B.O., Mariasiu, F., Moldovanu, D., Iclodean, C. - Electric and Plug-In Hybrid Vehicles, Springer, 2015
5. Mehrdad Ehsani, Yimin Gao, Ali Emadi - Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design, Second Edition (Power Electronics and Applications Series) 2nd Edition, CRCPress, 2009

9. Corroboration of the discipline's contents with the expectations of epistemical community's representatives, professional associations and representative employers in the domain associated to the program

The course develops competences which facilitate a better understanding of topics, concepts and theories relating to Energy Systems managed by Systems Engineering principles in Vehicles (Electric and Hybrid), which play an essential part in the advanced instruction of the electrical engineer, energy engineer, automatization engineer etc.

10. Evaluations

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Weight in the final grade
10.4 Course	Knowledge of general aspects of vehicles principles and architecture	Exam	60%
10.5 Tutorial class/lab	The capacity to accomplish individual documentation and research	Evaluation essay/book review	20%
	Correct solving of the specifically problems in homework	The homework evaluations	20%
10.6 Minimal standard of performance			
Acquirement of the competences and abilities previously mentioned at a minimum level of 5			

Date of completion
1.09.2021

Signature of the course's professor
Assoc. Prof. Ioan Corneliu Salisteanu

Signature of the tutorial class professor
Assoc. Prof. Ioan Corneliu Salisteanu

Date of the approval in the department
27.09.2021

Signature of the Head of Department,
Assoc. Prof. Dr. Mihai BIZOI

VALAHIA UNIVERSITY OF TARGOVISTE
FACULTY OF ELECTRICAL ENGINEERING, ELECTRONICS, AND INFORMATIONAL TECHNOLOGY
AUTOMATION, INFORMATION AND ELECTRICAL ENGINEERING DEPARTMENT

SYLLABUS

According to the curriculum 2021-2022

1. Information about the program

1.1 Higher education institution	**Valahia University of Targoviste**
1.2 Faculty/Department	**Faculty of Electrical Engineering, Electronics and Informational Technology**
1.3 Department	**Automation, Information And Electrical Engineering Department**
1.4 Domain of study	**Electrical Engineering**
1.5 Cycle of study	**Master**
1.6 Studies program/Qualification	**Integrated Electrical Systems Engineering in Vehicles**

2. Information about the discipline

2.1 Name of the discipline				**Numerical methods for PDE and applications**			
2.2 Owner of the courses				Lecturer Alin Pohoata			
2.3 Owner of the tutorial classes				Lecturer Alin Pohoata			
2.4 Year of study	I	2.5 Semester	I	2.6 Type of evaluation	E	2.7 Status of the discipline	Compulsory

3. Estimated total time (hours of academic activities in a semester)

3.1 Number of hours in a week	3	of which: 3.2 course	1	3.3 tutorial class/lab	2L
3.4 Total of hours in the curricula	42	of which: 3.5 course	14	3.6 tutorial class/lab	28

Distribution of the effective time	hours
Study according to manual, course support, bibliography and notes	10
Additional documentation in the library, on specialized electronic platforms and in the field	10
Tutorial class preparation/labs, homeworks, papers, portfolios and essays	10
Tutela	10
Examinations	4
Other activities	10
3.7 Total hours of individual study	**58**
3.9 Total hours in a semester	**100**
3.10 Number of credits	**4**

4. Preconditions (if case)

4.1 of curriculum	-LET 1 B F 02 Mathematical Analysis, -LET 1 B F 11 Applied Mathematics -LET 2 B F 02 Numerical Methods
4.2 of competences	A good knowledge of basic techniques for the elaboration of essays, book reviews, synthetic papers

5. Conditions (if case)

5.1 for course development

Regular course classroom (25 places, video projector)
5.2 for tutorial class/lab development Regular course classroom (25 places, video projector, computers)

6. Specific cumulated competences

Professional competencies	**C2.1** Theoretical and practical concepts of electric and electromechanical systems command and control, modelling, simulation and testing of the electric propulsion system, power electronics components, thermal sub-assemblies regime, in the field of vehicles integrated electrical systems, using software and hardware resources. **C2.2** Interpretation of the phenomena specific to the operation of vehicles integrated electrical systems, based on testing, command analysis, thermal regime analysis and electric propulsion system analysis using software and hardware resources. **C2.6** Identification and sizing of the main constructive and functional elements in the vehicles integrated electrical systems by analysing the control, analysis, modelling and simulation of electrical, electromechanical and power electronic systems, the heating and cooling of components, by using dedicated software and hardware. **C5.1** Specific design concepts based on modelling and numerical simulation of the interactions and behaviour of components of vehicles integrated electrical systems. **C5.2** Developing solutions through the use of specialized knowledge for modelling, testing and numerical simulation of the components of electrical systems integrated into vehicles behaviour **C5.3** The ability to accomplish numerical models for analysis, modelling, testing and simulation of the components behaviour of an electrical system. **C5.6** Solving a problem of a Systems Engineering specific solution validation that tracks the behaviour of vehicles integrated electrical systems components using modelling and numerical simulation.
Transversal competencies	CT1 Identifying the requirements, resources, processes, deadlines and risks necessary to prepare the execution plan and to carry out the professional and organizational tasks in compliance with the ethical norms agreed by the society. CT3 Self-control and planning of training needs, efficient use of information and communication resources, and assisted training (Internet portals, specialized software applications, databases, on-line courses, etc.) to meet the personal career development plan. CT4 Creative application of research techniques and solving specific problems related to the vehicles integrated electrical systems engineering.

7. Purposes of the discipline (according to the specific cumulated competences grid)

7.1 General purposes of the discipline	The overall objective of the course is to acquire the necessary knowledge for numerically solving of the differential equations which models the phenomena that occur in electrical vehicle systems.
7.2 Specific purposes	• Applying the concepts, theories and fundamental investigation methods and their optimization • Understand the concept of numerical analysis and differential equations.

8.Contents

8.1 Course	Teaching method	Observations
Ordinary Differential Equations. Initial value problems.	Lecture, problematization, debate, heuristic dialogues	1h
Numerical Methods for ODE.	Lecture, problematization,	1h

	debate, heuristic dialogues	
One step methods: Euler method, Runge-Kutta methods.	Lecture, problematization, debate, heuristic dialogues	1h
Multi-step methods: Adams-Bashforth method, Milne-Simpson method.	Lecture, problematization, debate	1h
Examples of using numerical methods for ODE in electrical engineering problems: transmission line segment, voltage multipliers.	Lecture, problematization	1h
Partial Differential Equations, Boundary Value Problems.	Lecture, problematization	1h
Laplace Equation.	Lecture, problematization, heuristic dialogues	1h
Finite Difference Method.	Lecture, problematization, debate	1h
Finite Difference Method for 2D Laplace Boundary Value Problem.	Lecture, problematization, debate	1h
Successive Over Relaxation Method.	Lecture, problematization, debate	1h
Applications in Electrical Engineering. Electric vector field.	Lecture, problematization, debate, heuristic dialogues	1h
Introduction in Finite Elements Method.	Lecture, problematization	3h

Bibliography:

1. **Stanisław Rosłoniec,** *Fundamental Numerical Methods for Electrical Engineering,* 2008 Springer-Verlag Berlin Heidelberg
2. **Grossmann, C.; Roos, H.-G.; Stynes,M**.*: Numerical treatment of partial differential equations.* Springer, Heidelberg-Berlin, 2007
3. **Dean G. Duffy,** *Advanced Engineering Mathematics with MATLAB, 2011 CRC Press, Boca Raton USA*
4. **Alfio Quarteroni, Fausto Salieri,** *Scientific Comping with MATLAB, 2003* Springer-Verlag Berlin Heidelberg
5. **Norbert Hungerbühler,** *Einführung in Partielle Diferentialgleichungen für Ingenieure, Chemiker, und Naturwissenschftler,* 1997 Hochschulverlag AG an den ETH Zürich

8.2 Tutorial class/lab	Teaching methods	Observations
Introduction in MATLAB	Lecture, problematization	4h
Solving linear algebraic systems in MATLAB.	Lecture, problematization	4h
Numerical methods in MATLAB for ODE.	Lecture, problematization, debate, heuristic dialogues	4h
PDE tool in MATLAB.	Lecture, problematization, debate	4h
Finite Difference Method in MATLAB.	Lecture, problematization	4h
Finite Element Method in MATLAB	Lecture, problematization	8h

Bibliography:

1. **http://www.mathworks.com/help/matlab/index.html**
2. **Jaan Kiusalaas**.*: Numerical Methods in Engineering with MATLAB.* 2005 Cambridge University Press, New York
3. **Dean G. Duffy,** *Advanced Engineering Mathematics with MATLAB, 2011 CRC Press, Boca Raton USA*
4. **Alfio Quarteroni, Fausto Salieri,** *Scientific Comping with MATLAB, 2003* Springer-Verlag Berlin Heidelberg
5. **ERWIN KREYSZIG,** *Advanced Engineering Mathematics,* 2006 John Wiley & Sons, Inc.

9. Corroboration of the discipline's contents with the expectations of epistemical community's representatives, professional associations and representative employers in the domain associated to the program

The course develops competences which necessary for a mathematical modeling, which play an essential part in the advanced instruction of electrical engineer, energy engineer, automatization engineer etc.

10. Evaluations

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Weight in the final grade
10.4 Course	Theoretical knowledge of differential equations and numerical solving algorithms.	Exam	40%
	The capacity to accomplish individual documentation research in the frame of restricted autonomy and qualified assistance	Evaluation essay/	20%
	Correct solving of the specifically problems in project theme	The project evaluations	40%
10.6 Minimal standard of performance			
Acquirement of the competences and abilities previously mentioned at a minimum level of 5			

Date of completion
1.09.2021

Signature of the course's professor
Lecturer Alin Pohoata

Signature of the tutorial class professor
Lecturer Alin Pohoata

Date of the approval in the department
27.09.2021

Signature of the Head of Department,
Assoc. Prof. Dr. Mihai BIZOI

VALAHIA UNIVERSITY OF TARGOVISTE
FACULTY OF ELECTRICAL ENGINEERING, ELECTRONICS AND INFORMATION TECHNOLOGY
AUTOMATION, INFORMATION AND ELECTRICAL ENGINEERING DEPARTMENT

SYLLABUS

According to the curriculum 2021-2022

1. Information about the program

1.1 Higher education institution	**Valahia University of Targoviste**
1.2 Faculty/Department	**Faculty of Electrical Engineering, Electronics and Informational Technology**
1.3 Department	**Automation, Information And Electrical Engineering Department**
1.4 Domain of study	**Electrical Engineering**
1.5 Cycle of study	**Master**
1.6 Studies program/Qualification	**Integrated Electrical Systems Engineering in Vehicles**

2.Information about the discipline

2.1 Name of the discipline				**Development and management of object oriented software projects**			
2.2 Owner of the courses				**Prof. Luminita DUTA**			
2.3 Owner of the tutorial classes				**Prof. Luminita DUTA**			
2.4 Year of study	I	2.5 Semester	I	2.6 Type of evaluation	E	2.7 Status of the discipline	Compulsory

3. Estimated total time (hours of academic activities in a semester)

3.1 Number of hours in a week	3	of which: 3.2 course	1	3.3 tutorial class/lab	2L
3.4 Total of hours in the curricula	42	of which: 3.5 course	14	3.6 tutorial class/lab	28

Distribution of the effective time	hours
Study according to manual, course support, bibliography and notes	10
Additional documentation in the library, on specialized electronic platforms and in the field	14
Tutorial class preparation/labs, homeworks, papers, portfolios and essays	10
Tutela	10
Examinations	4
Other activities	10
3.7 Total hours of individual study	**58**
3.9 Total hours in a semester	**100**
3.10 Number of credits	**4**

4. Preconditions (if case)

4.1 of curriculum	LET 1 B F 05 - Computer Programming and Programming Languages 1 LET 1 B F 12 - Computer Programming and Programming Languages 2
4.2 of competences	A good knowledge of basic techniques for the elaboration of essays, book reviews, synthetic papers

5. Conditions (if case)

5.1 for course development Regular course classroom (25 places, video projector)
5.2 for tutorial class/lab development Regular course classroom (25 places, video projector)

6. Specific cumulated competences

Professional competencies	**C3.1** Theoretical and practical concepts of electric vehicle capabilities, object-oriented software development, communication protocols, acquisition and processing of data, vehicle behaviour analysis as part of Smart Grid, in the field of vehicles integrated electrical systems. **C3.2** Use of specialized knowledge for software development, communications, data acquisition and processing, capabilities and interconnected operation in the field of vehicles integrated electrical systems. **C3.3** Using the conceptual and methodological set for the development of new software solutions and professional projects in order to ensure an adequate flow of information and the fulfilment of the specific requirements of the specialized standards. **C3.4** Development and analysis of software solutions, communications and operational safety for new projects. **C3.5** The ability to develop technically and economically optimized software, communications and operational solutions, in the field of integrated electrical systems **C3.6** Solving an operational and analysing problem of a vehicles integrated electrical system that uses object-oriented software, interfaces and communication protocols specific to data acquisition and processing, respecting the safety principles in operation. **C7.3** Conceiving, designing and proposing new technical solutions for intelligent control of integrated systems, based on specific hardware and software architectures. **C7.4** Developing critical analyses to support the viability of new hardware and software solutions within an integrated system. **C7.5** Ability to design projects for hardware and software solutions within an integrated system
Transversal competencies	CT2 Sharing roles and responsibilities in a team, performing leadership roles, coordinating the work, taking responsibility for the decisions, and establishing a communication strategy. CT3 Self-control and planning of training needs, efficient use of information and communication resources, and assisted training (Internet portals, specialized software applications, databases, on-line courses, etc.) to meet the personal career development plan.

7. Purposes of the discipline (according to the specific cumulated competences grid)

7.1 General purposes of the discipline	To form abilities in object oriented programming. To learn how to represent object oriented projects in UML language. To use the Agile software development which allow collaboration between self-organizing cross-functional teams.
7.2 Specific purposes	To use Scrum, that is an agile way to manage a project, usually software development. Agile software development with Scrum is used as a framework

8.Contents

8.1 Course	Teaching method	Observations
Course 1 The five steps of software design	Lecture	1 hour
Course 2 Object Oriented models representation	Lecture, problematization, debate, heuristic dialogues	1 hour
Course 3 Development models (RUP, XP, Agile, Lean, Scrum)	Lecture, problematization, debate, heuristic dialogues	1 hour
Course 4 Modelling languages (UML) Use-case diagrams	Lecture, problematization, debate	1 hour
Course 5 Reverse engineering, Sequence and collaboration diagrams	Lecture, problematization	1 hour
Course 6 State diagrams, Deployment diagrams GRASP	Lecture, problematization	1 hour
Course 7 Design Patterns: Definitions, Elements, Classification	Lecture, problematization, heuristic dialogues	1 hour

Course 8 Design Patterns: Creational Patterns, Structural Patterns	Lecture, problematization, debate	1 hour
Course 9 Design Patterns: Behavioral Patterns	Lecture, problematization, debate	1 hour
Course 10 Concurrency, Testing, Distributed Patterns	Lecture, problematization, debate	1 hour
Course 11 Test driven development	Lecture, problematization, debate, heuristic dialogues	1 hour
Course 12 Programs quality. Metrics.	Lecture, problematization, debate, heuristic dialogues	1 hour
Course 13 Agile technics for programs developing	Lecture, problematization, debate	1 hour
Course 14 SCRUM	Lecture, problematization, debate, heuristic dialogues	1 hour

Bibliography:

Craig Larman, Applying UML and patterns – an introduction to object-oriented analysis and design and iterative development, Prentice Hall, 2nd edition, 2005.

Ian Sommerville, Software engineering, Adisson-Wesley, 9th edition, 2011. 8th edition

B. Bruegge, A. H. Dutoit, Prentice Object Oriented Software Engineering Using UML Patterns and Java, Pearson, 3rd edition, 2012.

S. R. Schach, Object Oriented And Classical Software Engineering, McGraw Hill, 8th edition, 2010.

E. Gamma, R. Helm, R. Johnson, J. Vlissides, Design Patterns. Elements of Reusable Object-Oriented Software, Addison-Wesley, 1995.

Len Bass, Paul Clements, Rick Kazman, Software architecture in practice, Pearson, Addison Wesley, 2nd edition, 2003.

Frank Buchmann, Regine Meunier, Peter Sommerlad, Michael Stal, Pattern-oriented software architecture – a system of patterns, John Wiley & Sons, 1996.

Software Engineering Body of Knowledge, IEEE, 2004, (http://www.swebok.org).

M. Bloch, S. Blumberg, J. Laartz, Delivering large-scale IT projects on time, on budget, and on value.pdf, 2012.

M. Cosulschi: Note de curs, 2015.

8.2 Tutorial class/lab	Teaching methods	Observations
Lab 1 Object oriented representation of projects. UML language	Lecture, problematization	2 hours
Lab 2 Class diagrams, use case diagrams UML	Lecture, problematization, debate, heuristic dialogues	2 hours
Lab 3 State diagrams, sequence diagrams	Lecture, problematization, debate	2 hours
Lab 4 Deployment diagrams	Lecture, problematization, debate	2 hours
Lab 5 Techniques for testing software	Lecture, problematization, debate	2 hours
Lab 6 Reverse engineering	Lecture, problematization, debate	2 hours
Lab 7 Design patterns	Lecture, problematization, debate	2 hours
Lab 8 Metrics for programs quality	Lecture, problematization, debate	2 hours
Lab 9 AGILE techniques 1	Lecture, problematization	2 hours
Lab 10 AGILE techniques 2	Lecture, problematization, debate	2 hours
Lab11 AGILE management process with SCRUM	Lecture, problematization, debate	2 hours
Lab 12 AGILE management process with SCRUM	Lecture, problematization, debate, heuristic dialogues	2 hours
Lab 13 AGILE management process with SCRUM	Lecture, problematization, debate, heuristic dialogues	2 hours
Lab 14 AGILE management process with SCRUM	Lecture, problematization, debate, heuristic dialogues	2 hours

Bibliography:

Ian Sommerville, Software engineering, Adisson-Wesley, 9th edition, 2011. 8th edition

B. Bruegge, A. H. Dutoit, Prentice Object Oriented Software Engineering Using UML Patterns and Java, Pearson, 3rd edition, 2012.

S. R. Schach, Object Oriented And Classical Software Engineering, McGraw Hill, 8th edition, 2010.
http://www.ciprianpungila.com/uvt/ip/2010/index.html
https://profs.info.uaic.ro/~adiftene/Scoala/2015/IP/index.htm
Luminita Duta: Note de curs, http://moodle.fie.valahia.ro/

9. Corroboration of the discipline's contents with the expectations of epistemical community's representatives, professional associations and representative employers in the domain associated to the program

Businesses and companies in the areas of Targoviste and neighboring counties:

- Renault România;
- SC Oțelinox Târgoviște;
- SC Arctic Găești;
- SC Metchel Târgoviște;

10. Evaluations

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Weight in the final grade
10.4 Course	The correct and adequate use of UML diagrams for modeling an object oriented project	Exam	20%
	A good knowledge of design patterns for developing and testing software projects	Exam	20%
10.5 Tutorial class/lab	A good knowledge of SCRUM AGILE framework	Exam	60%
10.6 Minimal standard of performance			

Date of completion
01.09.2021

Signature of the course's professor
Prof. Luminita Duta

Signature of the tutorial class professor
Prof. Luminita Duta

Date of the approval in the department
27.09.2021

Signature of the Head of Department,
Associate Prof. Mihai BIZOI

VALAHIA UNIVERSITY OF TARGOVISTE
FACULTY OF ELECTRICAL ENGINEERING, ELECTRONICS AND INFORMATION TECHNOLOGY
AUTOMATION, INFORMATION AND ELECTRICAL ENGINEERING DEPARTMENT

SYLLABUS

According to the curriculum 2021-2022

1. Information about the program

1.1 Higher education institution (HEI)	Valahia University of Targoviste
1.2 Faculty/Department	Electrical Engineering, Electronics and Information Technology
1.3 Department	**Automation, Information And Electrical Engineering Department**
1.4 Field of study	**Electrical Engineering**
1.5 The course	**Master**
1.6 Study program / qualification	**Integrated Electrical Systems Engineering in Vehicles**

2. Information about the discipline

2.1 Course title				**Automotive electronics**			
2.2 Holder of the course activities				Associate Professor Mihai ARDELEANU			
2.3 Holder of the laboratory activities				Associate Professor Mihai ARDELEANU			
2.4 Year of study	I	2.5 Semester	I	2.6 Evaluation Type	E	2.7 Discipline regime	Mandatory

3. Total estimated time (hours per semester of teaching activities)

3.1 Number of hours per week	3	from which: 3.2 course	2	3.3 laboratory	1
3.4 Total hours of curriculum	42	from which: 3.5 curs	28	3.6 laboratory	14
Time distribution					Hours
Study after manual, course support, bibliography and notes					10
Additional library documentation, specialized electronic platforms on the field					14
Training seminars / labs, homeworks, portfolios and essays					14
Tutoring					10
Examinations					4
Other activities					6
3.7 Total hours individual study					**58**
3.9 Total hours per semester					**100**
3.10 Number of credits					**4**

4. Preconditions (where applicable)

4.1 of curriculum	LET 2 B D 04 - Electronic Devices LET 1 B D 16 – Electronic Circuits
4.2 of competences	Circuits with operational amplifiers, CAN, SPI, I2C Bus microcontrollers connection

5. Conditions (where applicable)

5.1 of the course	Projector
5.2 of conducting laboratory	Hardware: laboratory platforms Software: PROTEUS ISIS

6. Specific competences acquired

Professional competencies	**C2.1** Theoretical and practical concepts of electric and electromechanical systems command and control, modelling, simulation and testing of the electric propulsion system, power electronics components, thermal sub-assemblies regime, in the field of vehicles integrated electrical systems, using software and hardware resources. **C2.6** Identification and sizing of the main constructive and functional elements in the vehicles integrated electrical systems by analysing the control, analysis, modelling and simulation of electrical, electromechanical and power electronic systems, the heating and cooling of components, by using dedicated software and hardware. **C4.1** Theoretical and practical concepts of measuring, acquisition, processing and communicating data, electrical and electronic assembly, sensors and transducers from vehicles integrated electrical systems. **C4.2** Elaboration of technical solutions for measurement, communication, acquisition and processing of data using sensors, transducers and electrical and electronic assemblies in the field of vehicles integrated electrical systems. **C4.3** Integrated use of technical knowledge and methodologies for the design and development of electric and electronic systems for measuring, communicating, acquiring and processing information using sensors and transducers. **C4.4** Critical analysis of experimental results obtained with sensors and transducers under different test conditions. **C4.6** Correctly identify the specific methodological norms of measuring, communicating, acquiring and processing data systems using sensors and transducers and performing electric and electronic assemblies to identify concrete measures to ensure compliance. **C7.1** Theoretical and applied concepts of functional principles and hardware and software architectures for intelligent process control of vehicles integrated electrical systems. **C7.4** Developing critical analyses to support the viability of new hardware and software solutions within an integrated system.
Transversal competencies	CT1 Identifying the requirements, resources, processes, deadlines and risks necessary to prepare the execution plan and to carry out the professional and organizational tasks in compliance with the ethical norms agreed by the society. CT2 Sharing roles and responsibilities in a team, performing leadership roles, coordinating the work, taking responsibility for the decisions, and establishing a communication strategy.

7. Course objectives

7.1 Overall objective of discipline	To provide notions about electronic circuits used in the main components of information and control of vehicle
7.2 Specific objectives	1. To make known the sensors and transducers of some specific sizes of automotive equipment 2. To present the electronic components, design and testing mode of circuits used in the control systems, display and information, as well as in the safety and comfort auto systems

8. Contents

8.1 Course	Teaching methods	Hours
Engine electronics (Fuel injection rate control, throttle control, cooling system control, OBD)	lecture, lecture - debate, explanation, problem solving, brainstorming, personal reflection,	4
Chassis electronics (ABS, TCS, EBD, ESP, PA)		2
Passive safety (Air bag, emergency brake assist EBA)		2
Driver assistance (Cruise control, Blind spot detection, Park assist, Pre-collision assist)		2

Passenger comfort (Automatic climate control, Automatic seat adjustment with memory, Automatic wipers (rain detection), Automatic headlamps)	the exercise, debate Case Study *The teaching materials* PPT slides projector laptop	2
Automative microcontrollers		6
Electric vehicle		6
Intelligent Transportation Systems		4

References

1. A. Emadi, *Handbook of Automotive Power Electronics and Motor Drives,* CRC Press, **2005**.
2. Robert Bosch GmbH, *Electronic Automotive Handbook,* Bosch **2002**
3. R. K. Jurgen, *Automotive Electronics Handbook,* McGraw-Hill, **1999**. Web source: http://www.gbv.de/dms/ilmenau/toc/171940121.PDF
4. N. Navet, F. S. Lion Automotive Embedded Systems Hand**book**
5. W. B. Ribbens, *Understanding Automotive Electronics,* Newnes, 2003. Web source: http://www.engineering108.com/Data/Engineering/Automobile/Understanding-Automotive-Electronics.pdf
6. Cooling system of the internal combustion engine https://www.youtube.com/watch?v=y5p31F_dVJU
7. Electric car explained by TESLA Company: https://www.youtube.com/watch?v=3SAxXUIre28
8. Electric vehicle powertrain [Johnson Control] https://www.youtube.com/watch?v=wEEBBXm2BsM
9. TM4 electric powertrain technologies https://www.youtube.com/watch?v=a7bytjEEdP4
10. Intelligent Transportation Systems: EU version https://www.youtube.com/watch?v=oQpU39CyLa0
11. Intelligent Transportation Systems: Korean version https://www.youtube.com/watch?v=dS4pWnNlxfA

8.2 Laboratory	Teaching methods	Hours
Laboratory	questioning, personal reflection, the exercise, debate, case study	**14h**
Fuel injection rate (Proteus simulation No.1+Microcontroller Project No.1) – uC generates PWM applied to injector device		2h
Cooling system control (Proteus simulation No.2+Microcontroller Project No.2) – the temperature sensor of the coolant circuit is intercepted by uC for feedback and the pump and fan are actioned respecting an specific algorithm		2h
Electronic Control Unit (Proteus simulation No.3+Microcontroller Project No.3)- uC simulates an ECU for simultaneous acting of coolant circuit and fuel rate injection control		2h
ABS (Proteus simulation No.4+Microcontroller Project No.4) – uC detects the rotational quantum of the wheel movement to create input for ABS algorithm		2h
Airbag (Proteus simulation No.5+Microcontroller Project No.5) – uC detects the signal of crash sensor to generate the command system of inflator		2h
Automatic wipers (Proteus simulation No.6) – Function simulation		2h
Automatic climate control (Proteus simulation No.7) – Function simulation		2h

References

1. L. Dumitriu, *Electronică pentru automobile,* Ed. Fides, Iaşi, 2008.
3. U. Kiencke, L. Nielsen, *Automotive Control Systems,* Springer, 2000.Web source:
4. http://160592857366.free.fr/joe/ebooks/Automative%20engineering%20books/Automotive%20Control%20Systems.pdf
5. A. Bonnick, *Automotive Computer Controlled Systems,* Butterworth-Heinemann, 2001.
6. Inverter explained https://www.youtube.com/watch?v=qVeERT4nyz8
7. MOSFET utilisation https://www.youtube.com/watch?v=GrvvkYTW_0k&t=278s
8. ECU explained https://www.youtube.com/watch?v=f-W3FFegUnY
9. Airbag explained https://www.youtube.com/watch?v=I_hkGN8TiJY
10. Crash sensor explained https://www.youtube.com/watch?v=mWSlwhYyOhI
11. Changing direction signal https://www.youtube.com/watch?v=FQnVqpSBE_4
12. OBD gadget https://www.youtube.com/watch?v=aotAu3G0QVw

9. Corroborating the discipline contents expectations of epistemic community representatives, employers associations and representative of the employers for the program

Accumulated knowledge and skills acquired graduates:
1. addressing practical elements regarding specific automotive electronics;
2. highlight a support base in the area of automotive electronics;
3. employment in the local industry – CTT Renault Titu.

10. Evaluation

Activity type	10.1 Evaluation Criteria	10.2 Evaluation methods	10.3 Percentage of the final grade
10.4 Course	Final written exam that includes five theory topics		50%
10.5 Laboratory	Report Laboratory (experimental determinations, results and conclusions) Final test laboratory	Project solving result	50%
10.6 Minimum performance standard:			
grade 5 in the final exam, grade 5 in lab work			

Completion date
1.09.2021

Signature course holder
Associate Professor Mihai ARDELEANU

Laboratory holder's signature
Associate Professor Mihai ARDELEANU

Approval date in Department
27.09.2021

Signature Director of Department
Associated Professor Mihai BIZOI

VALAHIA UNIVERSITY OF TARGOVISTE
FACULTY OF ELECTRICAL ENGINEERING, ELECTRONICS AND INFORMATIONAL TECHNOLOGY
AUTOMATION, INFORMATION AND ELECTRICAL ENGINEERING DEPARTMENT

SYLLABUS
According to the curriculum 2021-2022

1. Information about the program

1.1 Higher education institution	**Valahia University of Targoviste**
1.2 Faculty/Department	**Faculty of Electrical Engineering, Electronics and Informational Technology**
1.3 Department	**Automation, Information And Electrical Engineering Department**
1.4 Domain of study	**Electrical Engineering**
1.5 Cycle of study	**Master**
1.6 Studies program/Qualification	**Integrated Electrical Systems Engineering in Vehicles**

2.Information about the discipline

2.1 Name of the discipline				**Applied Research 1 – Automotive operating systems**			
2.2 Owner of the courses				-			
2.3 Owner of the tutorial classes				Associate professor Mihai BIZOI			
2.4 Year of study	I	2.5 Semester	I	2.6 Type of evaluation	C	2.7 Status of the discipline	Compulsory

3. Estimated total time (hours of academic activities in a semester)

3.1 Number of hours in a week	2	of which: 3.2 course	0	3.3 tutorial class/lab	2
3.4 Total of hours in the curricula	28	of which: 3.5 course	0	3.6 tutorial class/lab	28

Distribution of the effective time	hours
Study according to manual, course support, bibliography and notes	20
Additional documentation in the library, on specialized electronic platforms and in the field	20
Tutorial class preparation/labs, homeworks, papers, portfolios and essays	20
Tutela	10
Examinations	2
Other activities	-
3.7 Total hours of individual study	72
3.9 Total hours in a semester	**100**
3.10 Number of credits	**4**

4. Preconditions (if case)

4.1 of curriculum	
4.2 of competences	

5. Conditions (if case)

5.1 for course development -

5.2 for tutorial class/lab development

6. Specific cumulated competences

Professional competencies	**C1.3** Theoretical and practical concepts of electric vehicle capabilities, object-oriented software development, communication protocols, acquisition and processing of data, vehicle behaviour analysis as part of Smart Grid, in the field of vehicles integrated electrical systems. **C1.4** Correctly define objectives and achieve realistic work plans **C7.1** Theoretical and applied concepts of functional principles and hardware and software architectures for intelligent process control of vehicles integrated electrical systems. **C7.2** Understand and interpret the phenomena specific to intelligent control of vehicles integrated electrical systems through hardware and software architectures. **C7.3** Conceiving, designing and proposing new technical solutions for intelligent control of integrated systems, based on specific hardware and software architectures. **C7.4** Developing critical analyses to support the viability of new hardware and software solutions within an integrated system. **C7.5** Ability to design projects for hardware and software solutions within an integrated system **C7.6** Identify the hardware and software architecture that is suited to a specific smart control of a vehicles integrated electrical system. **C8.1** Specific concepts regarding methodologies, procedures and project elaboration, studies and team or individual reports for the purpose of design, virtual testing and implementation of electrical systems for vehicles. **C8.4** The ability to evaluate complex problems and to communicate demonstratively the results of their own assessment.
Transversal competencies	CT3 Self-control and planning of training needs, efficient use of information and communication resources, and assisted training (Internet portals, specialized software applications, databases, on-line courses, etc.) to meet the personal career development plan.

7. Purposes of the discipline (according to the specific cumulated competences grid)

7.1 General purposes of the discipline	• Subject objective consist of assimilation by the student of the specific tools of the scientific research and practice: documentation techniques, acquisition techniques, experimental processing and interpretation, principles of development of research reports, multimedia presentation techniques, etc.
7.2 Specific purposes	• Elaboration of studies, reports and synthesis of documentation, respectively technical-economic; • Solving specific design research problems in the field of integrated electrical systems engineering in vehicles • Achievement of experimental research with the use of modern equipment • Elaboration of the practical works being part of a team in the frame of complex projects

8.Contents

8.1 Course	Teaching method	Observations
8.2 Tutorial class/lab	Teaching methods	Observations
• Choosing the topic and the coordinator of the dissertation thesis		28 h
• Independent realization of a documentary on a theme related to the subject of the dissertation		
• Performing experiments related to the given theme		
• Writing a research report		
• Making a public presentation of the work		
Bibliography:		

9.Corroboration of the discipline's contents with the expectations of epistemical community's representatives, professional associations and representative employers in the domain associated to the program

In order to draft the contents, to select the teaching/learning methods, the lecturer has organized meetings with members of Renault and other organizations, that are specialized in the field of Integrated Electrical Systems Engineering in Vehicles, and also in the field of technologies and equipment that are involved within the design and testing processes of automotive industry; meetings with representatives of public institutions (ministries, local authorities etc.); and meetings with other academic teachers in the field. The meeting has aimed the identification of the requirements and the expectations of employers in the field, and also to synchronize the syllabus with similar programs that are developed within other academic institutions.

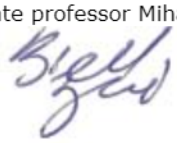
10. Evaluations

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Weight in the final grade
10.4 Course			
10.5 Tutorial class/lab	Activity during the semester	Written and oral evaluation	80%
	Final colloquy	Oral evaluation	20%
10.6 Minimal standard of performance			
Acquirement of the competences and abilities previously mentioned at a minimum level of 5			

Date of completion
1.09.2021

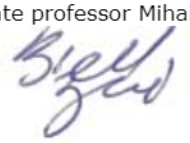
Signature of the course's professor

Signature of the tutorial class professor
Associate professor Mihai BIZOI



Date of the approval in the department
27.09.2021

Signature of the Head of Department,
Associate professor Mihai BIZOI



VALAHIA UNIVERSITY OF TARGOVISTE
FACULTY OF ELECTRICAL ENGINEERING, ELECTRONICS AND INFORMATIONAL TECHNOLOGY
AUTOMATION, INFORMATION AND ELECTRICAL ENGINEERING DEPARTMENT

SYLLABUS
According to the curriculum 2021-2022

1. Information about the program

1.1 Higher education institution	**Valahia University of Targoviste**
1.2 Faculty/Department	**Faculty of Electrical Engineering, Electronics and Informational Technology**
1.3 Department	**Automation, Information and Electrical Engineering Department**
1.4 Domain of study	**Electrical Engineering**
1.5 Cycle of study	**Master**
1.6 Studies program/Qualification	**Integrated Electrical Systems Engineering in Vehicles**

2. Information about the discipline

2.1 Name of the discipline				**Electric propulsion systems for EV**			
2.2 Owner of the courses				**Associate professor Oliver Magdun**			
2.3 Owner of the tutorial classes				**Associate professor Oliver Magdun**			
2.4 Year of study	I	2.5 Semester	II	2.6 Type of evaluation	E	2.7 Status of the discipline	Compulsory

3. Estimated total time (hours of academic activities in a semester)

3.1 Number of hours in a week	4	of which: 3.2 course	2	3.3 tutorial class/lab	2L
3.4 Total of hours in the curricula	56	of which: 3.5 course	28	3.6 tutorial class/lab	28

Distribution of the effective time	hours
Study according to manual, course support, bibliography and notes	10
Additional documentation in the library, on specialized electronic platforms and in the field	10
Tutorial class preparation/labs, homework, papers, portfolios and essays	10
Tutor	5
Examinations	2
Other activities	7
3.7 Total hours of individual study	**44**
3.9 Total hours in a semester	**100**
3.10 Number of credits	**4**

4. Preconditions (if case)

4.1 of curriculum	LET 1 B D 15 – Electrical Engineering 1 (Electricity and Magnetism) LET 2 B D 03 – Electrical Engineering 2 (Circuit Theory) LET 3 B D 02 – Electromechanical convertors LET 4 O S 04 – Special Electrical Machines LET 2 B D 04 - Electronic devices LET 2 B D 10 - Electronic circuits
4.2 of competences	Theoretical Electrical Engineering, Electric Machines, Electronics

5. Conditions (if case)

5.1 for course development Regular course classroom (25 places, video projector)
5.2 for tutorial class/project development Regular course classroom (25 places, 15 computers) Research Centre for Practical Experiments

6. Specific cumulated competences

Professional competencies	**C2.1** Theoretical and practical concepts of electric and electromechanical systems command and control, modelling, simulation and testing of the electric propulsion system, power electronics components, thermal sub-assemblies regime, in the field of vehicles integrated electrical systems, using software and hardware resources. **C2.2** Interpretation of the phenomena specific to the operation of vehicles integrated electrical systems, based on testing, command analysis, thermal regime analysis and electric propulsion system analysis using software and hardware resources. **C2.3** The ability to respond to the demands of the specialized market by developing professional projects and proposing innovative technical solutions, making efficient use of existing solutions. **C2.4** Critical analyses to highlight the advantages and the competitiveness of new solutions of integrated electrical systems developed in relation to the existing offers on the market **C2.6** Identification and sizing of the main constructive and functional elements in the vehicles integrated electrical systems by analysing the control, analysis, modelling and simulation of electrical, electromechanical and power electronic systems, the heating and cooling of components, by using dedicated software and hardware. **C5.1** Specific design concepts based on modelling and numerical simulation of the interactions and behaviour of components of vehicles integrated electrical systems. **C5.2** Developing solutions through the use of specialized knowledge for modelling, testing and numerical simulation of the components of electrical systems integrated into vehicles behaviour. **C8.1** Specific concepts regarding methodologies, procedures and project elaboration, studies and team or individual reports for the purpose of design, virtual testing and implementation of electrical systems for vehicles. **C8.2** Creative use of knowledge for the performance and characteristics of vehicle-specific systems testing. **C8.3** Development of the conceptual and methodological set for increasing the individual work capacity in order to achieve specific tasks for the industry. **C8.4** The ability to evaluate complex problems and to communicate demonstratively the results of their own assessment. **C8.6** The ability to properly analyse and model electrical systems, design, testing and validate the solutions proposed for vehicles integrated electrical systems.
Transversal competencies	CT1 Identifying the requirements, resources, processes, deadlines and risks necessary to prepare the execution plan and to carry out the professional and organizational tasks in compliance with the ethical norms agreed by the society. CT3 Self-control and planning of training needs, efficient use of information and communication resources, and assisted training (Internet portals, specialized software applications, databases, on-line courses, etc.) to meet the personal career development plan.

7. Purposes of the discipline (according to the specific cumulated competences grid)

7.1 General purposes of the discipline	The overall objective of the course is to deepen knowledge of the solutions for modern propulsion systems in Electric Vehicles starting with electric drives used for powertrains, batteries/ electric energy storage systems and going to charging systems.
7.2 Specific purposes	• To introduce students in modern electric propulsion systems solutions. • To provide knowledge of electric vehicles propulsion system components (electric drives, batteries, charging solutions). • To introduce students to the tools and methodology associated with modern electric propulsion systems. • To provide students with experience in identifying and analyse different propulsion solutions used in electric vehicles. • To provide students with know-how and practical approaches in testing and prototyping of electric propulsion systems for vehicles.

8. Contents

8.1 Course	Teaching method	Observations
Configurations and Performance of Electric Vehicles (Traction Motor Characteristics, Tractive Effort and Transmission Requirement, Vehicle Performance, Tractive Effort in Normal Driving, Energy Consumption)	Presentation of the concepts and interactive lecture.	2 hours
DC Motor Drives (Principle of Operation and Performance, Combined Armature Voltage and Field Control, Multi-quadrant Operation)	Presentation of the concepts and interactive lecture.	3 hours
Induction Motor Drives (Basic Operation Principles of Induction Motors, Steady-State Performance, Constant Volt/Hertz Control, Power Electronic Control, Field Orientation Control, Voltage Source Inverter for FOC)	Presentation of the concepts and interactive lecture.	3 hours
Permanent Magnetic Brush-Less DC/AC Motor Drives (Properties of PM Materials, Basic Principles of BLDC Motor Drives, Basic Principles of BLAC Motor Drives, BLDC/AC Machine Construction and Classification)	Presentation of the concepts and interactive lecture.	3 hours
Switched Reluctance Motor Drives (Basic Magnetic Structure, Torque Production, Modes of Operation, Regenerative Braking)	Presentation of the concepts and interactive lecture.	3 hours
Vibration and Acoustic Noise in SRM, SRM Design	Presentation of the concepts and interactive lecture.	3 hours
Electric Energy Storage Systems (Battery Building Blocks, The Octagon Battery, Battery Terminology, Battery Types, Recharging Batteries and Charging Cycles, Fast and Ultra-Fast Charging, Battery State-Charge, Ultra-Capacitors, Fuel Cell Technology)	Presentation of the concepts and interactive lecture.	6 hours
Charging Systems (DC Charging Systems, AC Charging Systems, and Normal / Fast / Ultra-Fast Charging Technology, Charging Points Components).	Presentation of the concepts and interactive lecture.	5 hours

Bibliography:

1. Mehrdad Ehsani, Yimin Gao, Ali Emadi - Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design, Second Edition (Power Electronics and Applications Series) 2nd Edition, CRCPress, 2009
2. C.C. Chan and K.T. Chau, Modern Electric Vehicle Technology, Oxford University Press, Oxford, 2001
3. J.F. Gieras and M. Wing, Permanent Magnet Motor Technology, Design and Applications, Marcel Dekker, Inc., New York, 1997
4. D.C. Hanselman, Brushless Permanent-Magnet Motor Design, McGraw-Hill Inc., New York, 1994
5. B. Fahimi, G. Suresh, and M. Ehsani, Design considerations of switched reluctance motors: vibration and control issues, in Proceedings of the 1999 IEEE Industry Application Society Annual Meeting, Phoenix, AZ, Oct. 1999

8.2 Tutorial class/lab	Teaching methods	Observations
Electric Motors Technology (modelling, design and calculation, design testing and validation)	Concepts recap, debate, dialogues, problem solving, practical presentation	10 hours
Battery Packs assembly, connecting, testing and evaluation	Concepts recap, debate, dialogues, problem solving, practical presentation	10 hours
Charging tests on battery packs (Fast/ Ultra-Fast Charging)	Concepts recap, debate, dialogues, problem solving, practical presentation	8 hours

Bibliography:

1. Mehrdad Ehsani, Yimin Gao, Ali Emadi - Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals,

Theory, and Design, Second Edition (Power Electronics and Applications Series) 2nd Edition, CRCPress, 2009
2. C.C. Chan and K.T. Chau, Modern Electric Vehicle Technology, Oxford University Press, Oxford, 2001
3. J.F. Gieras and M. Wing, Permanent Magnet Motor Technology, Design and Applications, Marcel Dekker, Inc., New York, 1997
4. D.C. Hanselman, Brushless Permanent-Magnet Motor Design, McGraw-Hill Inc., New York, 1994
5. B. Fahimi, G. Suresh, and M. Ehsani, Design considerations of switched reluctance motors: vibration and control issues, in Proceedings of the 1999 IEEE Industry Application Society Annual Meeting, Phoenix, AZ, Oct. 1999

9. Corroboration of the discipline's contents with the expectations of epistemically community's representatives, professional associations and representative employers in the domain associated to the program

The course develops competences which facilitate a better understanding of topics, concepts and theories relating to Energy Systems as Electric Propulsion Systems for Vehicles, which play an essential part in the advanced instruction of the energy engineer, electrical engineer, automatization engineer, electronics engineer etc.

10. Evaluations

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Weight in the final grade
10.4 Course	Knowledge of aspects related to electric propulsion systems for EV	Exam	60%
10.5 Tutorial class/lab	Homework, tests	Evaluation essay/book review	20%
	Analysing and interpretation of data collected during lab experiments	The laboratory evaluations	20%
10.6 Minimal standard of performance			
Acquirement of the competences and abilities previously mentioned at a minimum level of 5			

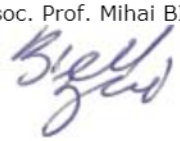
Date of completion
1.09.2021

Signature of the course's professor
Assoc. Prof. Oliver Magdun

Signature of the tutorial class professor
Assoc. Prof. Oliver Magdun

Date of the approval in the department
27.09.2021

Signature of the Head of Department,
Assoc. Prof. Mihai BIZOI



SYLLABUS

According to the curriculum 2021-2022

1. Information about the program

1.1 Higher education institution	**Valahia University of Targoviste**
1.2 Faculty/Department	**Faculty of Electrical Engineering, Electronics and Informational Technology**
1.3 Department	**Automation, Information And Electrical Engineering Department**
1.4 Domain of study	**Electrical Engineering**
1.5 Cycle of study	**Master**
1.6 Studies program/Qualification	**Integrated Electrical Systems Engineering in Vehicles**

2. Information about the discipline

2.1 Name of the discipline				**Methods and devices for advanced measurement systems**			
2.2 Owner of the courses				**Professor Valentin Dogaru - Ulieru**			
2.3 Owner of the tutorial classes				**Professor Valentin Dogaru - Ulieru**			
2.4 Year of study	I	2.5 Semester	II	2.6 Type of evaluation	E	2.7 Status of the discipline	Compulsory

3. Estimated total time (hours of academic activities in a semester)

3.1 Number of hours in a week	3	of which: 3.2 course	2	3.3 tutorial class/lab	1
3.4 Total of hours in the curricula	42	of which: 3.5 course	28	3.6 tutorial class/lab	14

Distribution of the effective time	hours
Study according to manual, course support, bibliography and notes	10
Additional documentation in the library, on specialized electronic platforms and in the field	10
Tutorial class preparation/labs, homeworks, papers, portfolios and essays	15
Tutela	9
Examinations	4
Other activities	10
3.7 Total hours of individual study	**58**
3.9 Total hours in a semester	**100**
3.10 Number of credits	**4**

4. Preconditions (if case)

4.1 of curriculum	LET 1 B D 15 – Theoretical Electrical Engineering LET 2 B D 11 – Electronic Devices and Circuits LET 1 B F 02 - Algebra and Mathematical Analysis LET 1 B F 10 - Physics
4.2 of competences	A good knowledge of basic techniques for the elaboration of project

5. Conditions (if case)

5.1 for course development Regular course classroom (25 places, video projector)

5.2 for tutorial class/project development Regular course classroom (25 places, 8 computers)

6. Specific cumulated competences

Professional competencies	**C4.1** Theoretical and practical concepts of measuring, acquisition, processing and communicating data, electrical and electronic assembly, sensors and transducers from vehicles integrated electrical systems. **C4.2** Elaboration of technical solutions for measurement, communication, acquisition and processing of data using sensors, transducers and electrical and electronic assemblies in the field of vehicles integrated electrical systems. **C4.3** Integrated use of technical knowledge and methodologies for the design and development of electric and electronic systems for measuring, communicating, acquiring and processing information using sensors and transducers. **C4.4** Critical analysis of experimental results obtained with sensors and transducers under different test conditions. **C4.5** Design of technically-economically viable solutions for measurement systems using sensors and transducers **C4.6** Correctly identify the specific methodological norms of measuring, communicating, acquiring and processing data systems using sensors and transducers and performing electric and electronic assemblies to identify concrete measures to ensure compliance. **C7.2** Understand and interpret the phenomena specific to intelligent control of vehicles integrated electrical systems through hardware and software architectures. **C7.4** Developing critical analyses to support the viability of new hardware and software solutions within an integrated system. **C8.2** Creative use of knowledge for the performance and characteristics of vehicle-specific systems testing. **C8.3** Development of the conceptual and methodological set for increasing the individual work capacity in order to achieve specific tasks for the industry. **C8.4** The ability to evaluate complex problems and to communicate demonstratively the results of their own assessment. **C8.6** The ability to properly analyse and model electrical systems, design, testing and validate the solutions proposed for vehicles integrated electrical systems.
Transversal competencies	CT1 Identifying the requirements, resources, processes, deadlines and risks necessary to prepare the execution plan and to carry out the professional and organizational tasks in compliance with the ethical norms agreed by the society. CT3 Self-control and planning of training needs, efficient use of information and communication resources, and assisted training (Internet portals, specialized software applications, databases, on-line courses, etc.) to meet the personal career development plan.

7. Purposes of the discipline (according to the specific cumulated competences grid)

7.1 General purposes of the discipline	The overall objective of the course is to deepen knowledge of the fundamental concepts and principles of modern measurement, sensors and transducers and automotive sensors applications
7.2 Specific purposes	• Applying the concepts, theories and fundamental investigation methods and their optimization • Realization in electric vehicle of virtual measurements

8. Contents

8.1 Course	Teaching method	Observations
Chapter I. Fundamental concepts and principles of modern measurement	Lecture	4 hours
Chapter II. Sensors and transducers. Automotive sensors applications	Lecture, problematization, debate, heuristic dialogues	8 hours
Chapter III. Measurement techniques to improve the accuracy of smart sensor systems	Lecture, problematization, debate, heuristic dialogues	6 hours
Chapter IV. Computer measuring systems	Lecture, problematization, debate	6 hours
Chapter V. Virtual measurements		4 hours

Bibliography:

1. William J. Fleming - Overview of Automotive Sensors, IEEE SENSORS JOURNAL, VOL. 1, NO. 4, DECEMBER 2001
2. Jiri Marek, Hans-Peter Trah, Yasutoshi Suzuki, Iwao Yokomori- Sensors for Automotive Applications, 2003
3. Maria Teresa Restivo, Fernando Gomes de Almeida,..-Handbook of Laboratory Measurements and Instrumentation, International Frequency Sensor Association, 2011
4. Sergey Y. Yurish - Digital Sensors and Sensor System, International Frequency Sensor Association, 2011
5. Robert Northrop - Introduction to instrumentation and measurement, Taylor & Francis Group, 2005
6. John Turner - Automotive sensors, New York, NY : Momentum Press, 2009
7. Sing Yiu Cheung, ...- Traffic Measurement and Vehicle, Classification with a Single Magnetic Sensor, California PATH

Working Paper, UCB-ITS-PWP-2004-7
8. ***-Signal Conditioning and PC-Based Data Acquisition Handbook- http://dsp-book.narod.ru/SCPCDAC.pdf
9. ***-Signal Conditioning Fundamentals for PC-Based Data Acquisition Systems
10. http://physweb.bgu.ac.il/COURSES/SignalNoise/signal_conditioning.pdf -
11. ***Keithley-Data Acquisition and Control Handbook - https://fenix.tecnico.ulisboa.pt/downloadFile/3779571242401/Data%20Acquisition_KEYTHLEY.pdf
12. *** - Honeywell - Hall Effect Sensing and Application
13. *** - Automotive Sensors &Instrumentation

8.2 Tutorial class/lab	Teaching methods	Observations
L.I. Measurement units and measurement standards	Lecture, problematization, debate, dialogues	2 hour
L.II. Methods for precision measurement of dc current and dc voltage	Lecture, problematization, debate, dialogues	2 hour
L.III. Measurement using oscilloscopes	Lecture, problematization, debate, dialogues	2 hour
L.IV. Signal conditioning	Lecture, problematization, debate, dialogues	2 hour
L.V. Digital Processing of the Measurement Signals	Lecture, problematization, debate, dialogues	2 hour
L.VI. Data acquisition	Lecture, problematization, debate, dialogues	2 hour
L.VII. Interface buses for standalone/modular instruments	Lecture, problematization, debate, dialogues	2 hour

Bibliography:
- Electronic measurement and instrumentation-lab.manual

9. Corroboration of the discipline's contents with the expectations of epistemical community's representatives, professional associations and representative employers in the domain associated to the program

The course develops competences which facillitate a better understanding of topics, concepts and theories relating to measurement &instrumentation, automotive sensors, signal conditioning and data acquisition in electrical vehicles. The methods and devices for advanced measurement systems laboratory in electrical vehicles has the objective to familiarize the student with the operation of basic (ammeter, voltmeter, multimeter, oscilloscope, etc), computer and virtual instruments.

10. Evaluations

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Weight in the final grade
10.4 Course	Knowledge of aspects of measurement and instrumentation techniques in electrical and nonelectrical quantities	Exam	40%
10.5 Tutorial class/lab	Lecture-based grades (homework, quizzes and tests)	Evaluation essay/book review	30%
	Analyze and interpret data gathered during weekly lab exercises and final laboratory project experiment (lab activities and reports, lab final)	The project evaluations	30%
10.6 Minimal standard of performance			
Acquirement of the competences and abilities previously mentioned at a minimum level of 5			

Date of completion
1.09.2021

Signature of the course's professor
Prof. Valentin Dogaru – Ulieru

Signature of the tutorial class professor
Prof. Valentin Dogaru – Ulieru

Date of the approval in the department
27.09.2021

Signature of the Head of Department,
Assoc. Prof. Mihai BIZOI

VALAHIA UNIVERSITY OF TARGOVISTE
FACULTY OF ELECTRICAL ENGINEERING, ELECTRONICS AND INFORMATION TECHNOLOGY
AUTOMATION, INFORMATION AND ELECTRICAL ENGINEERING DEPARTMENT

SYLLABUS

According to the curriculum 2021-2022

1. Information about the program

1.1 Higher education institution	**Valahia University of Targoviste**
1.2 Faculty/Department	**Faculty of Electrical Engineering, Electronics and Informational Technology**
1.3 Department	**Automation, Information And Electrical Engineering Department**
1.4 Domain of study	**Electrical Engineering**
1.5 Cycle of study	**Master**
1.6 Studies program/Qualification	**Integrated Electrical Systems Engineering in Vehicles**

2. Information about the discipline

2.1 Name of the discipline				**Communication and Interconnecting Devices**			
2.2 Owner of the courses				**Assoc. Prof. PhD. Eng. Henri-George COANDĂ**			
2.3 Owner of the tutorial classes				**Assoc. Prof. PhD. Eng. Henri-George COANDĂ**			
2.4 Year of study	I	2.5 Semester	II	2.6 Type of evaluation	E	2.7 Status of the discipline	Compulsory

3. Estimated total time (hours of academic activities in a semester)

3.1 Number of hours in a week	3	of which: 3.2 course	2	3.3 tutorial class/lab	1L
3.4 Total of hours in the curricula	42	of which: 3.5 course	28	3.6 tutorial class/lab	14

Distribution of the effective time	hours
Study according to manual, course support, bibliography and notes	10
Additional documentation in the library, on specialized electronic platforms and in the field	15
Tutorial class preparation/labs, homeworks, papers, portfolios and essays	15
Tutela	10
Examinations	8
Other activities	
3.7 Total hours of individual study	**58**
3.9 Total hours in a semester	**100**
3.10 Number of credits	**4**

4. Preconditions (if case)

4.1 of curriculum	LET 2 B D 04 - Electronic Devices LET 2 B D 10 – Electronic Circuits
4.2 of competences	-

5. Conditions (if case)

5.1 for course development Regular course classroom (25 places, video projector)

6. Specific cumulated competences

Professional competencies	**C3.1** Theoretical and practical concepts of electric vehicle capabilities, object-oriented software development, communication protocols, acquisition and processing of data, vehicle behaviour analysis as part of Smart Grid, in the field of vehicles integrated electrical systems. **C3.2** Use of specialized knowledge for software development, communications, data acquisition and processing, capabilities and interconnected operation in the field of vehicles integrated electrical systems. **C3.3** Using the conceptual and methodological set for the development of new software solutions and professional projects in order to ensure an adequate flow of information and the fulfilment of the specific requirements of the specialized standards. **C3.4** Development and analysis of software solutions, communications and operational safety for new projects. **C3.5** The ability to develop technically and economically optimized software, communications and operational solutions, in the field of integrated electrical systems **C3.6** Solving an operational and analysing problem of a vehicles integrated electrical system that uses object-oriented software, interfaces and communication protocols specific to data acquisition and processing, respecting the safety principles in operation. **C4.1** Theoretical and practical concepts of measuring, acquisition, processing and communicating data, electrical and electronic assembly, sensors and transducers from vehicles integrated electrical systems. **C4.2** Elaboration of technical solutions for measurement, communication, acquisition and processing of data using sensors, transducers and electrical and electronic assemblies in the field of vehicles integrated electrical systems. **C4.3** Integrated use of technical knowledge and methodologies for the design and development of electric and electronic systems for measuring, communicating, acquiring and processing information using sensors and transducers. **C4.6** Correctly identify the specific methodological norms of measuring, communicating, acquiring and processing data systems using sensors and transducers and performing electric and electronic assemblies to identify concrete measures to ensure compliance. **C7.1** Theoretical and applied concepts of functional principles and hardware and software architectures for intelligent process control of vehicles integrated electrical systems. **C7.2** Understand and interpret the phenomena specific to intelligent control of vehicles integrated electrical systems through hardware and software architectures. **C7.5** Ability to design projects for hardware and software solutions within an integrated system **C8.3** Development of the conceptual and methodological set for increasing the individual work capacity in order to achieve specific tasks for the industry. **C8.4** The ability to evaluate complex problems and to communicate demonstratively the results of their own assessment.
Transversal competencies	CT1 Identifying the requirements, resources, processes, deadlines and risks necessary to prepare the execution plan and to carry out the professional and organizational tasks in compliance with the ethical norms agreed by the society. CT3 Self-control and planning of training needs, efficient use of information and communication resources, and assisted training (Internet portals, specialized software applications, databases, on-line courses, etc.) to meet the personal career development plan.

7. Purposes of the discipline (according to the specific cumulated competences grid)

7.1 General purposes of the discipline	Promoting digital technologies used in the automotive industry for communication between distributed applications.
7.2 Specific purposes	Understanding the concept of bus communication and ways of access to the communication environment. Emphasizing communication interface protocols and

	standards for data exchange using wired or wireless solutions.

8. Contents

8.1 Course	Teaching method	Observations
Automotive network communications - architecture, protocols and standards	Lecture, problematization, debate, heuristic dialogues	4
Communication interfaces and type of cables - RS232, RS485, Ethernet, OBD, STP, UTP, coaxial, optical fiber.		4
CAN interfaces for - PC and Industrial Computers - Protocol Operation Control, Coding and Decoding, Frame Format, Media Access Control, Study of cases		4
LIN - Local Interconnect Network - Protocol Operation Control, Coding and Decoding, Frame Format, Media Access Control, study cases		4
FlexRay – Communications System Protocol Specification - Protocol Operation Control, Coding and Decoding, Frame Format, Media Access Control, Study of cases		4
HIL - Hardware In the Loop - Renault architecture and testing solutions - Simulation with MatLab and Simulink – study cases		4
Communication systems for wide and local area - GPRS, GPS, Wi-Fi, Bluetooth		4

Bibliography:

1. Steve Mackay, Edwin Wright, Deon Reynders, John Park, *Practical, Indiustrial Data Networks – Design, Installation and Troubleshooting*, Ed. Elsevier, 2004
2. Dan Eisenreich, Brian DeMuth, *Design Embedded Internet Devices*, Ed. Elsevier, 2003
3. * STMicroelectronics, *AN1278 Application Notes*, 2002
4. Stéphane REY, *Introduction to LIN*, 2003
5. FlexRay, *FlexRay Communications System Protocol Specification*, 2010
6. Jinan USR IOT Technology Limited, *USR-GPRS232-730 User Manua*l, 2016
7. Dobrescu R., Dobrescu M., Coanda H.G., *Aplicatii distribuite*, Ed. Bibliotheca, 2003, ISBN 973-8413-07-9
8. Coanda H.G., Ion Fl., Caciula I., *10 pași pentru crearea proiectelor utilizând Step7 și WinCC* , Valahia University Press, Târgoviște, 2017, 192 pagini, 2017;
9. Coanda H.G., Minca E., Ion Fl., Caciula I., *Solutions for Driving 2DW/1FW Mobile Robots using Sliding-Mode Control*, Journal of Electrical Engineering, Electronics, Control and Computer Science (JEEECCS), vol. 2, no. 6, pp. 1-10, ISSN 2457-7812, 2016
10. Puchianu D.C., Coanda H.G. , *Highway congestion – cause, components, solutions*, University Politehnica of Bucharest Scientific Bulletin, series C, vol. 70, no. 1, 2008, pp. 69÷76, ISSN 1454-234x;

8.2 Tutorial class/lab	Teaching methods	Observations
Study RS232, RS485 interfaces. Simple code using MikroC and Proteus	problematization, debate, heuristic dialogues	2
OBD interface – frame structure, protocol analyzer, signals waveforms		2
A case study of CAN architecture using Microchip development board		2
LIN interface – frame structure, protocol analyzer, signals waveforms		2
FlexRey – frame structure, protocol analyzer, signals waveforms		2
Data communications using GPRS and GPS solutions		2
Devices interconnecting using Wi-Fi and Bluetooth solutions		2

Bibliography:

1. Steve Mackay, Edwin Wright, Deon Reynders, John Park, *Practical, Indiustrial Data Networks – Design, Installation and Troubleshooting*, Ed. Elsevier, 2004
2. Dan Eisenreich, Brian DeMuth, *Design Embedded Internet Devices*, Ed. Elsevier, 2003
3. * STMicroelectronics, *AN1278 Application Notes*, 2002
4. Stéphane REY, *Introduction to LIN*, 2003
5. FlexRay, *FlexRay Communications System Protocol Specification*, 2010
6. John J. Janczak, *Implementation of a Hardware-in-the-Loop System Using Scale Model Hardware for Hybrid Electric Vehicle Development* , master thesis, 2007
7. Jinan USR IOT Technology Limited, *USR-GPRS232-730 User Manua*l, 2016
8. Coanda H.G., Ion Fl., Dragoi I.C., Diaconu E., *Aplicații distribuite – îndrumar de laborator,* Ed. Valahia University Press, Târgoviște, 2017, 120 pagini, 2017
9. Coanda H.G., *Designing a Control System for Smart Outdoor Street Lighting using Advanced Communication Technologies*, The Scientific Bulletin of the Electrical Engineering Faculty – Year 2015, no. 1, pp. 25-30, ISSN 1843-6188
10. Rotaru M., Stanciu C., Ciochina S., Albu F., Coanda H.G., *A FPGA Implementation of Prediction Error*

Method for Adaptive Feedback Cancellation using Xilinx System Generator, IARIA 2013 (ADAPTIVE 2013), Valencia, Spania, ISBN 978-1-61208-274-5, pp. 26-29
11. Coanda H.G., Niculescu E.R., *Access control system – solution based on new software and communications technologies*, The Scientific Bulletin of the Electrical Engineering Faculty – Year 2013, no. 4, pp. 10 – 15, ISSN 1843-6188
12. Dobrescu R., Dobrescu M., Popescu D., Coanda H.G., *Embedded Wireless Homecare Monitoring System*, International Conference on eHealth, Telemedicine, and Social Medicine, Cancun, Mexic, pp. 66-71, 1-6 februarie 2009, eTELEMED, DOI 10.1109/eTELEMED.2008.58, ISBN 978-1-4244-3360-5, WOS:000267007800012

9. Corroboration of the discipline's contents with the expectations of epistemical community's representatives, professional associations and representative employers in the domain associated to the program

The course develops competences which facilitate a better understanding of topics, concepts and theories relating to Area Studies, which play an essential part in the advanced automotive network communications.

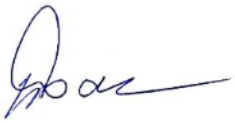
10. Evaluations

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Weight in the final grade
10.4 Course	An adequate use of key concepts of Area Studies applied to the region specifically considered.	Exam	20%
	A good knowledge of the main and fundamental elements of the discipline area..	Exam	20%
	Implementing some algorithms for specific applications.	Exam	20%
10.5 Tutorial class/lab	The capacity to identify the best solutions to accomplish individual or teamwork tasks using information from laboratory manual and, if it is possible, less help from the professor.	Evaluation essay/book review	25%
	An effective use of resources and learning techniques. Team work.	Permanent evaluation, tutorial classes	15%
10.6 Minimal standard of performance			
Acquirement of the competences and abilities previously mentioned at a minimum level of 5 as: - explain the concepts of bus communication, medium access control, flow control, protocol stack; - explanation of acronyms used in the field and specifying the values of voltage and current signals that are involved in fieldbus communication; - specification of standards in the field and rapid identification of documents in the field; - specifying the differences between the studied technologies;			

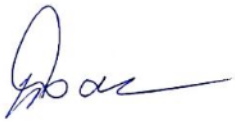
Date of completion

1.09.2021

Signature of the course's professor
Assoc. Prof. Henri-George COANDĂ



Signature of the tutorial class professor
Assoc. Prof. Henri-George COANDĂ



Date of the approval in the department
27.09.2021

Signature of the Head of Department,
Assoc. Prof. Mihai BIZOI

VALAHIA UNIVERSITY OF TARGOVISTE
FACULTY OF ELECTRICAL ENGINEERING, ELECTRONICS AND INFORMATION TECHNOLOGY
AUTOMATION, INFORMATION AND ELECTRICAL ENGINEERING DEPARTMENT

SYLLABUS

1. Information about the program

1.1 Higher education institution	**Valahia University of Targoviste**
1.2 Faculty/Department	**Faculty of Electrical Engineering, Electronics and Informational Technology**
1.3 Department	**Automation, Information and Electrical Engineering Department**
1.4 Domain of study	**Electrical Engineering**
1.5 Cycle of study	**Master**
1.6 Studies program/Qualification	**Integrated Electrical Systems Engineering in Vehicles**

2.Information about the discipline

2.1 Name of the discipline				**Integrated data acquisition systems**			
2.2 Owner of the courses				**Assoc.Prof. Traian IVANOVICI**			
2.3 Owner of the tutorial classes				**Assoc.Prof. Traian IVANOVICI**			
2.4 Year of study	I	2.5 Semester	II	2.6 Type of evaluation	E	2.7 Status of the discipline	Compulsory

3. Estimated total time (hours of academic activities in a semester)

3.1 Number of hours in a week	2	of which: 3.2 course	1	3.3 tutorial class/lab	1L
3.4 Total of hours in the curricula	28	of which: 3.5 course	14	3.6 tutorial class/lab	14

Distribution of the effective time	hours
Study according to manual, course support, bibliography and notes	20
Additional documentation in the library, on specialized electronic platforms and in the field	20
Tutorial class preparation/labs, homeworks, papers, portfolios and essays	15
Tutela	15
Examinations	2
Other activities	
3.7 Total hours of individual study	**72**
3.9 Total hours in a semester	**100**
3.10 Number of credits	**4**

4. Preconditions (if case)

4.1 of curriculum	LET 1 B D 08 – Elements of electrical engineering LEI 3 B D 11 – Measurement of electrical and non-electrical quantities LEI 4 O S 15 – Data acquisition systems
4.2 of competences	Appropriate use of concepts and theories in the field of data acquisition systems and electrical measurements.

5. Conditions (if case)

5.1 for course development Regular course classroom (25 places, video projector)
5.2 for tutorial class/lab development Regular course classroom with PC, video projector and blackboard (25 places, video projector, blackboard)

6. Specific cumulated competences

Professional competencies	**C3.1** Theoretical and practical concepts of electric vehicle capabilities, object-oriented software development, communication protocols, acquisition and processing of data, vehicle behaviour analysis as part of Smart Grid, in the field of vehicles integrated electrical systems. **C3.2** Use of specialized knowledge for software development, communications, data acquisition and processing, capabilities and interconnected operation in the field of vehicles integrated electrical systems. **C3.3** Using the conceptual and methodological set for the development of new software solutions and professional projects in order to ensure an adequate flow of information and the fulfilment of the specific requirements of the specialized standards. **C3.4** Development and analysis of software solutions, communications and operational safety for new projects. **C3.5** The ability to develop technically and economically optimized software, communications and operational solutions, in the field of integrated electrical systems **C3.6** Solving an operational and analysing problem of a vehicles integrated electrical system that uses object-oriented software, interfaces and communication protocols specific to data acquisition and processing, respecting the safety principles in operation. **C4.1** Theoretical and practical concepts of measuring, acquisition, processing and communicating data, electrical and electronic assembly, sensors and transducers from vehicles integrated electrical systems. **C4.2** Elaboration of technical solutions for measurement, communication, acquisition and processing of data using sensors, transducers and electrical and electronic assemblies in the field of vehicles integrated electrical systems. **C4.3** Integrated use of technical knowledge and methodologies for the design and development of electric and electronic systems for measuring, communicating, acquiring and processing information using sensors and transducers. **C4.6** Correctly identify the specific methodological norms of measuring, communicating, acquiring and processing data systems using sensors and transducers and performing electric and electronic assemblies to identify concrete measures to ensure compliance. **C7.1** Theoretical and applied concepts of functional principles and hardware and software architectures for intelligent process control of vehicles integrated electrical systems. **C7.2** Understand and interpret the phenomena specific to intelligent control of vehicles integrated electrical systems through hardware and software architectures. **C7.5** Ability to design projects for hardware and software solutions within an integrated system **C8.3** Development of the conceptual and methodological set for increasing the individual work capacity in order to achieve specific tasks for the industry. **C8.4** The ability to evaluate complex problems and to communicate demonstratively the results of their own assessment.
Transversal competencies	CT2 Sharing roles and responsibilities in a team, performing leadership roles, coordinating the work, taking responsibility for the decisions, and establishing a communication strategy. CT3 Self-control and planning of training needs, efficient use of information and communication resources, and assisted training (Internet portals, specialized software applications, databases, on-line courses, etc.) to meet the personal career development plan.

7. Purposes of the discipline (according to the specific cumulated competences grid)

7.1 General purposes of the discipline	The presentation of fundamental knowledge on smart metering hardware and control software; knowledge of the basic elements of an intelligent data acquisition and the main characteristic parameters; knowledge of various system architectures for data acquisition and estimating different sources of errors; knowledge of computer-aided measurement techniques; study of communication interfaces; implementation of computer technology in smart metering, programming interface devices.
7.2 Specific purposes	Providing technical interdisciplinary thinking (electrical measurements, electronic, virtual instrumentation, data acquisition) and the assimilation of techniques for organizing specific applications; Formation of general technical competences, to enable a domain where data acquisition systems is the main objective of the work activity;

8.Contents

8.1 Course	Teaching method	Observations
Cap.1. Introduction to data acquisition and processing systems	Lecture, problematization, debate, heuristic dialogues	2 hours
Cap.2. Blocks functional components of data acquisition systems	Lecture, problematization, debate, heuristic dialogues	2 hours
Cap.3. Computerized measuring systems.	Lecture, problematization, debate, heuristic dialogues	2 hours
Cap.4. LabVIEW graphical programming. Virtual instruments.	Lecture, problematization, debate	4 hours
Cap.5. Data acquisition systems programming	Lecture, problematization	2 hours
Cap.6. Communications systems for data acquisition	Lecture, problematization	2 hours

Bibliography:

1. Antoniu Mihai - *Măsurări electronice*, Editura Satya, Iaşi, 1999, ISBN 973-98708-3-X
2. Cepişcă Costin, Şteflea Dumitru, Jula Nicolae – Traductoare în sistemele de măsurare, Ed. Conphys, Rm. Vâlcea, 2003, ISBN 973-8488-40-0
3. Dogaru Ulieru Valentin, Cepişcă Costin – *Măsurări şi sisteme de măsurare informatizate*, Ed. Electra, Bucureşti, 2004, ISBN 973-7728-15-7
4. Dolga V. - Sisteme de achiziţii de date, interfeţe şi instrumentaţie virtuală, Ed.Politehnica, Timisoara, 2008
5. Golovanov C., Albu M., Golovanov N., Todos P., Chiciuc A., ş.a., Probleme moderne de măsurare în electroeneregică, Editura Tehnică, 800 pag., Bucureşti, 2001.
6. Ivanovici Traian Daniel, Dogaru Ulieru Valentin – Instrumentaţie virtuală şi sisteme de achiziţie de date - Valahia University Press Târgovişte, 2011, ISBN 978-606-603-012-0
7. Szekely I., Szabo W., Munteanu R., Sisteme pentru Achiziţie şi prelucrarea datelor, Editura Mediamira, 1997.
8. * * * Data Acquisition and Control Handbook, Keithley, 2001

*** www.ni.com

8.2 Tutorial class/lab	Teaching methods	Observations
L01. Configuring acquisition channels - NI-DAQ	Lecture, problematization, debate, heuristic dialogues	2 hours
L02. Achiziţie tensiune continuă	Lecture, problematization, debate, heuristic dialogues	2 hours
L03. Acquisitionn DC voltage	Lecture, problematization, debate	2 hours
L04. AC signals acquisition - Three phase sistem voltage / current	Lecture, problematization, debate, heuristic dialogues	2 hours
L05. Harmonic analysis of a signal	Lecture, problematization, debate, heuristic dialogues	2 hours
L06. Acquisition analysis for different types of consumers	Lecture, problematization, debate, heuristic dialogues	2 hours
L07. Generating signals analog / digital	Lecture, problematization, debate, heuristic dialogues	2 hours

Bibliography:

1. Antoniu Mihai - *Măsurări electronice*, Editura Satya, Iaşi, 1999, ISBN 973-98708-3-X
2. Cepişcă Costin, Şteflea Dumitru, Jula Nicolae – Traductoare în sistemele de măsurare, Ed. Conphys, Rm. Vâlcea, 2003, ISBN 973-8488-40-0
3. Dogaru Ulieru Valentin, Cepişcă Costin – *Măsurări şi sisteme de măsurare informatizate*, Ed. Electra, Bucureşti, 2004, ISBN 973-7728-15-7
4. Dolga V. - Sisteme de achiziţii de date, interfeţe şi instrumentaţie virtuală, Ed.Politehnica, Timisoara, 2008
5. Golovanov C., Albu M., Golovanov N., Todos P., Chiciuc A., ş.a., Probleme moderne de măsurare în electroeneregică, Editura Tehnică, 800 pag., Bucureşti, 2001.
6. Ivanovici Traian Daniel, Dogaru Ulieru Valentin – Instrumentaţie virtuală şi sisteme de achiziţie de date - Valahia University Press Târgovişte, 2011, ISBN 978-606-603-012-0
7. Szekely I., Szabo W., Munteanu R., Sisteme pentru Achiziţie şi prelucrarea datelor, Editura Mediamira, 1997.
8. * * * Data Acquisition and Control Handbook, Keithley, 2001
9. *** www.ni.com

9.Corroboration of the discipline's contents with the expectations of epistemical community's representatives, professional associations and representative employers in the domain associated to the program

- Companies and firms in areas surrounding counties and Targoviste.

10. Evaluations

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Weight in the final grade
10.4 Course	• Acquiring the main notions regarding the appropriate use of concepts and theories in the field of data acquisition (acquisition / monitoring / data processing)	Exam written and oral examination concerning theoretical and practical knowledge of the acquisition	60%
10.5 Tutorial class/lab	• Applications understanding and how exercises solving. Correct solving of specific problems and homework.	Evaluation Oral examination concerning the assimilation of applicative knowledge and descriptionof laboratory work / workshop and homework	40%
10.6 Minimal standard of performance			
Acquirement of the competences and abilities previously mentioned at a minimum level of 5 -Assimilation of specialized language - Preparing homework. - Conduct a minimum of 70% of laboratory work - Know the principles, techniques and specific equipment to design and implement a data acquisition system - To know the hardware and software and Labview programming techniques that can enter the component data acquisition system			

Date of completion
1.09.2021

Signature of the course's professor
Assoc. Prof. Traian IVANOVICI

Signature of the tutorial class professor
Assoc. Prof. Traian IVANOVICI

Date of the approval in the department
27.09.2021

Signature of the Head of Department,
Assoc. Prof. Mihai BIZOI

VALAHIA UNIVERSITY OF TARGOVISTE
FACULTY OF ELECTRICAL ENGINEERING, ELECTRONICS AND INFORMATIONAL TECHNOLOGY
AUTOMATION, INFORMATION AND ELECTRICAL ENGINEERING DEPARTMENT

SYLLABUS

1. Information about the program

1.1 Higher education institution	**Valahia University of Targoviste**
1.2 Faculty/Department	**Faculty of Electrical Engineering, Electronics and Informational Technology**
1.3 Department	**Automation, Information And Electrical Engineering Department**
1.4 Domain of study	**Electrical Engineering**
1.5 Cycle of study	**Master**
1.6 Studies program/Qualification	**Integrated Electrical Systems Engineering in Vehicles**

2.Information about the discipline

2.1 Name of the discipline				**Applied Research 2 – Advanced composite materials for automotive industry**			
2.2 Owner of the courses				-			
2.3 Owner of the tutorial classes				Lecturer Adrian Catangiu			
2.4 Year of study	I	2.5 Semester	II	2.6 Type of evaluation	C	2.7 Status of the discipline	Compulsory

3. Estimated total time (hours of academic activities in a semester)

3.1 Number of hours in a week	2	of which: 3.2 course	0	3.3 tutorial class/lab	2
3.4 Total of hours in the curricula	28	of which: 3.5 course	0	3.6 tutorial class/lab	28

Distribution of the effective time	hours
Study according to manual, course support, bibliography and notes	20
Additional documentation in the library, on specialized electronic platforms and in the field	20
Tutorial class preparation/labs, homeworks, papers, portfolios and essays	15
Tutela	15
Examinations	2
Other activities	-
3.7 Total hours of individual study	72
3.9 Total hours in a semester	**100**
3.10 Number of credits	**4**

4. Preconditions (if case)

4.1 of curriculum	
4.2 of competences	

5. Conditions (if case)

5.1 for course development -
5.2 for tutorial class/lab development

6. Specific cumulated competences

Professional competencies	**C1.1** Theoretical concepts regarding vehicles integrated electrical systems, vehicle principles and architecture, materials used to manufacture them, environmental impact, cooling or heating of electrical components. **C1.3** Capability of thematic documentation, identifying the existing situation and requirements and interpreting previous achievements. **C1.4** Correctly define objectives and achieve realistic work plans **C1.5** The ability to analyse multiple alternative methods or solutions for choosing the most advantageous techno-economic compromise. **C1.6** The description based on mathematical models, of the vehicles integrated electrical systems operation, together with the justification for the choice of materials used for their manufacture, the manufacturing technologies, the modes for cooling or heating the electrical components and the impact on the environment. **C8.1** Specific concepts regarding methodologies, procedures and project elaboration, studies and team or individual reports for the purpose of design, virtual testing and implementation of electrical systems for vehicles. **C8.2** Creative use of knowledge for the performance and characteristics of vehicle-specific systems testing. **C8.3** Development of the conceptual and methodological set for increasing the individual work capacity in order to achieve specific tasks for the industry. **C8.4** The ability to evaluate complex problems and to communicate demonstratively the results of their own assessment.
Transversal competencies	CT3 Self-control and planning of training needs, efficient use of information and communication resources, and assisted training (Internet portals, specialized software applications, databases, on-line courses, etc.) to meet the personal career development plan. CT4 Creative application of research techniques and solving specific problems related to the vehicles integrated electrical systems engineering.

7. Purposes of the discipline (according to the specific cumulated competences grid)

7.1 General purposes of the discipline	• Subject objective consist of assimilation by the student of the specific tools of the scientific research and practice: documentation techniques, acquisition techniques, experimental processing and interpretation, principles of development of research reports, multimedia presentation techniques, etc.
7.2 Specific purposes	• Elaboration of studies, reports and synthesis of documentation, respectively technical-economic; • Solving specific design research problems in the field of integrated electrical systems engineering in vehicles • Achievement of experimental research with the use of modern equipment • Elaboration of the practical works being part of a team in the frame of complex projects

8.Contents

8.1 Course	Teaching method	Observations
8.2 Tutorial class/lab	Teaching methods	Observations
• Independent realization of a documentary on a theme related to the subject of the dissertation		28 h
• Performing experiments related to the given theme		
• Writing a research report		
• Making a public presentation of the work		
Bibliography:		

9.Corroboration of the discipline's contents with the expectations of epistemical community's representatives, professional associations and representative employers in the domain associated to the program

In order to draft the contents, to select the teaching/learning methods, the lecturer has organized meetings with members of Renault and other organizations, that are specialized in the field of Integrated Electrical Systems Engineering in Vehicles, and also in the field of technologies and equipment that are involved within the design and testing processes of automotive industry; meetings with representatives of public institutions (ministries, local authorities etc.); and meetings with other academic teachers in the field. The meeting has aimed the identification of the requirements and the expectations of employers in the field, and also to synchronize the syllabus with similar programs that are developed within other academic institutions.

10. Evaluations

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Weight in the final grade
10.4 Course			
10.5 Tutorial class/lab	Activity during the semester	Written and oral evaluation	80%
	Final colloquy	Oral evaluation	20%
10.6 Minimal standard of performance			
Acquirement of the competences and abilities previously mentioned at a minimum level of 5			

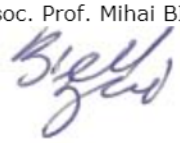
Date of completion
1.09.2021

Signature of the course's professor

Signature of the tutorial class professor
Lecturer Adrian Catangiu

Date of the approval in the department
27.09.2021

Signature of the Head of Department,
Assoc. Prof. Mihai BIZOI



VALAHIA UNIVERSITY OF TARGOVISTE
FACULTY OF ELECTRICAL ENGINEERING, ELECTRONICS AND INFORMATION TECHNOLOGY
AUTOMATION, INFORMATION AND ELECTRICAL ENGINEERING DEPARTMENT

SYLLABUS

1. Information about the program

1.1 Higher education institution	**Valahia University of Targoviste**
1.2 Faculty/Department	**Faculty of Electrical Engineering, Electronics and Informational Technology**
1.3 Department	**Automation, Information and Electrical Engineering Department**
1.4 Domain of study	**Electrical Engineering**
1.5 Cycle of study	**Master**
1.6 Studies program/Qualification	**Integrated Electrical Systems Engineering in Vehicles**

2.Information about the discipline

2.1 Name of the discipline				**Numerical Simulation of Integrated Embedded Systems**			
2.2 Owner of the courses				**Assoc. Prof. Florin Dragomir**			
2.3 Owner of the tutorial classes				**Assoc. Prof. Florin Dragomir**			
2.4 Year of study	**II**	2.5 Semester	**I**	2.6 Type of evaluation	**E**	2.7 Status of the discipline	Compulsory

3. Estimated total time (hours of academic activities in a semester)

3.1 Number of hours in a week	2	of which: 3.2 course	1	3.3 tutorial class/lab	1L
3.4 Total of hours in the curricula	28	of which: 3.5 course	14	3.6 tutorial class/lab	14

Distribution of the effective time	hours
Study according to manual, course support, bibliography and notes	20
Additional documentation in the library, on specialized electronic platforms and in the field	20
Tutorial class preparation/labs, homeworks, papers, portfolios and essays	15
Tutela	15
Examinations	2
Other activities	
3.7 Total hours of individual study	**72**
3.9 Total hours in a semester	**100**
3.10 Number of credits	**4**

4. Preconditions (if case)

4.1 of curriculum	IESEV 1 B O 02- Numerical methods for PDE and applications
4.2 of competences	Using fundamental knowledge of Mathematics, Electrical Engineering, Mechanical Engineering, Automation, Informatics and Computer Programming.

5. Conditions (if case)

5.1 for course development Regular course classroom (25 places, video projector)
5.2 for tutorial class/lab development Regular course classroom (25 places, PCs with Matlab/Simulink, video projector)

6. Specific cumulated competences

Professional competencies	**C2.1** Theoretical and practical concepts of electric and electromechanical systems command and control, modelling, simulation and testing of the electric propulsion system, power electronics components, thermal sub-assemblies regime, in the field of vehicles integrated electrical systems, using software and hardware resources. **C2.2** Interpretation of the phenomena specific to the operation of vehicles integrated electrical systems, based on testing, command analysis, thermal regime analysis and electric propulsion system analysis using software and hardware resources. **C2.3** The ability to respond to the demands of the specialized market by developing professional projects and proposing innovative technical solutions, making efficient use of existing solutions. **C2.4** Critical analyses to highlight the advantages and the competitiveness of new solutions of integrated electrical systems developed in relation to the existing offers on the market **C2.6** Identification and sizing of the main constructive and functional elements in the vehicles integrated electrical systems by analysing the control, analysis, modelling and simulation of electrical, electromechanical and power electronic systems, the heating and cooling of components, by using dedicated software and hardware. **C5.1** Specific design concepts based on modelling and numerical simulation of the interactions and behaviour of components of vehicles integrated electrical systems. **C5.2** Developing solutions through the use of specialized knowledge for modelling, testing and numerical simulation of the components of electrical systems integrated into vehicles behaviour. **C5.3** The ability to accomplish numerical models for analysis, modelling, testing and simulation of the components behaviour of an electrical system. **C5.4** The ability to provide software solutions for analysing components of an electrical system, arguing with performance and quality levels. **C5.5** Capacity of design solutions validation using technical and economical optimized software models in the field of vehicles integrated electrical systems. **C5.6** Solving a problem of a Systems Engineering specific solution validation that tracks the behaviour of vehicles integrated electrical systems components using modelling and numerical simulation.
Transversal competencies	CT2 Execution leadership roles, coordinating the work, taking responsibility for their decisions and establish a communication strategy in a multidisciplinary team CT3 Self-control and planning training needs, effective use of information sources and of communication resources and assisted professional training

7. Purposes of the discipline (according to the specific cumulated competences grid)

7.1 General purposes of the discipline	A good knowledge of the theoretical and applied analytical methods and techniques of modeling and simulation for the main components of an electric vehicle. A good knowledge of the discretization methods of continuous processes and methods for solving differential equations by numerical integration methods.
7.2 Specific purposes	Knowledge of the major problematics in Area Studies. Knowledge of the main scientific paradigms which dominated studies and interpretations in Area Studies.

8. Contents

8.1 Course	Teaching method	Observations
1. Introduction (2h) 1.1 The course objectives. 1.2 Electrical Vehicle Design and Modeling. 1.3 Vehicle modeling	Lecture, problematization, debate, heuristic dialogues	2 hours
2. Modeling and Simulation of High Performance Electrical Vehicle Powertrains in VHDL-AMS (4h)	Lecture, problematization, debate, heuristic dialogues	4 hours

2.1 Introduction. 2.2 Dynamic model. PMSM (permanent-magnet synchronous motor) model 2.3 Control strategy 2.4 Inverter model 2.5 Simulation results. Optimization with experimental designs		
3. Control of Hybrid Electrical Vehicles (4h) 3.1. Introduction. 3.2. Energy storage for HEV. 3.3. Electric motors used for hybrid electric vehicles propulsion. 3.4. Control strategies. 3.5. Experimental model of hybrid electric vehicle.	Lecture, problematization, debate, heuristic dialogues	4 hours
4. Mathematical Modelling and Simulation of a PWM Inverter Controlled Brushless Motor Drive System from Physical Principles for Electric Vehicle Propulsion Applications. (4h) 4.1. Introduction. 4.2. Mathematical modelling of a BLMD system. 4.3. Numerical simulation accuracy and experimental validation of BLMD model.	Lecture, problematization, debate, heuristic dialogues	4 hours

Bibliography:

1. Electric Vehicles - Modelling and Simulations, Edited by Seref Soylu, ISBN 978-953-307-477-1, 487 pages, Publisher: InTech, Chapters published September 12, 2011 under CC BY-NC-SA 3.0 license, DOI: 10.5772/958.
2. M. Jalalifar, A. F. Payam, S. Nezhad, H. Moghbeli, 2007Dynamic Modeling and Simulation of an Induction Motor with Adaptive Backstepping Design of an Input-Output Feedback Linearization Controller in Series Hybrid Electric Vehicle, Serbian Journal of Electrical Engineering, 42November 2007), 119132
3. Guinee, R.A.; (2009). A Novel Dead Time Compensation Circuit for Improved PWM Inverter Operation in Brushless Motor Drive Systems for Electric Vehicle, 5th IEEE Vehicle Power and Propulsion Conference (VPPC'09), Dearborn, MI 48128, USA
4. Gh. Livinţ, V. Horga, D. Sticea, M. Raţoi, M. Albu, 2009Electrical drives control of a hybrid electric vehicle experimental model, Proceedings of the 7th International Conference of Electromechanical and Power Systems, Editura PIM, 2009, vol. II, 2127ISBN vol II, 978-606-520-623-6, October 8-9, 2009, Iaşi, Romania
5. Gh. Livinţ, V. Horga, D. Sticea, M. Raţoi, M. Albu, 2010Hybrid electric vehicle experimental model with CAN network real time control, in Advances in Eectrical and Computer Engineering, nr. 2., 2010, 1021081582-7445Stefan cel Mare University of Suceava, Romania

8.2 Tutorial class/lab	Teaching methods	Observations
L01. Introduction in Matlab, Simulink, Simscape, Simscape Electronics, Simscape Driveline and Simscape Power Systems.	Lecture, problematization, development and execution of programs on PCs	2 hours
L02. Electric Vehicle Model (Simple model of an electric vehicle)	Lecture, problematization, development and execution of programs on PCs	2 hours
L03. Lithium Battery Model for Electric Vehicle (Multi-temperature lithium battery model using Simulink and Simscape)	Lecture, problematization, development and execution of programs on PCs	2 hours
L04. Hybrid Electric Vehicle (HEV) Power Train Using Battery Model (demonstration different operating modes of the HEV over one complete cycle: accelerating, cruising, recharging the battery while accelerating and regenerative braking)	Lecture, problematization, development and execution of programs on PCs	2 hours
L05. Fuel Cell Vehicle (FCV) Power Train (demonstration different operating modes of the FCV over one complete cycle: accelerating, cruising, recharging the battery while accelerating and regenerative braking.)	Lecture, problematization, development and execution of programs on PCs	2 hours
L06. Hybrid-Electric Vehicle Model in Simulink (Model of a hybrid-electric vehicle with system-level and detailed variants of electrical system)	Lecture, problematization, development and execution of programs on PCs	2 hours
L07. Modelling and Simulation of Solar Electric Vehicle	Lecture, problematization, development and execution of programs on PCs	2 hours

Bibliography:

1. D. Trif – Tehnici de simulare numerica cu MATLAB, Editura InfoData, Cluj-Napoca, 2007.

2. A. Quarteroni, F. Saleri – Scientific Computing with MATLAB and Octave, Second Edition, Springer-Verlag, Berlin, 2006.
3. M. Ghinea, V. Fireteanu – MATLAB. Calcul numeric, grafica, aplicatii, Editura Teora, Bucuresti, 2001.
4. Stefanoiu D., Matei I, Stoica P – Aspecte practice in modelarea si identificarea sistemelor, ed. Printech, 2004
5. Culita J., Stefanoiu D.-Modelare analitica si experimentala a sistemelor, ed. Printech, 2008
6. Popescu D.,Stefanoiu D., Lupu C.si altii – Automatica Industriala , ed. AGIR, 2006
7. Ştefănoiu D., Culiţă J., Stoica P. – Fundamentele Modelării şi Identificării Sistemelor, Ed. Printech, 2005

9. Corroboration of the discipline's contents with the expectations of epistemical community's representatives, professional associations and representative employers in the domain associated to the program

- SC Renault Romania – sucursala Titu
- SC Otelinox Targoviste;
- SC Arctic Gaesti;

10. Evaluations

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Weight in the final grade
10.4 Course	A good knowledge of the theoretical and applied analytical methods and techniques of modeling and simulation for the main components of an electric vehicle. A good knowledge of the discretization methods of continuous processes and methods for solving differential equations by numerical integration methods.	Exam	40%
10.5 Tutorial class/lab	Check assimilating information from the laboratory	Evaluation	40%
	An effective use of resources and learning techniques	Permanent evaluation, tutorial classes	20%
10.6 Minimal standard of performance			
Acquirement of the competences and abilities previously mentioned at a minimum level of 5			

Date of completion
1.09.2021

Signature of the course's professor
Assoc. Prof. Florin Dragomir

Signature of the tutorial class professor
Assoc. Prof. Florin Dragomir

Date of the approval in the department
27.09.2021

Signature of the Head of Department,
Assoc. Prof. Mihai Bizoi

VALAHIA UNIVERSITY OF TARGOVISTE
FACULTY OF ELECTRICAL ENGINEERING, ELECTRONICS AND INFORMATIONAL TECHNOLOGY
AUTOMATION, INFORMATION AND ELECTRICAL ENGINEERING DEPARTMENT

SYLLABUS

1. Information about the program

1.1 Higher education institution	**Valahia University of Targoviste**
1.2 Faculty/Department	**Faculty of Electrical Engineering, Electronics and Informational Technology**
1.3 Department	**Automation, Information and Electrical Engineering Department**
1.4 Domain of study	**Electrical Engineering**
1.5 Cycle of study	**Master**
1.6 Studies program/Qualification	**Integrated Electrical Systems Engineering in Vehicles**

2. Information about the discipline

2.1 Name of the discipline				**Heating / cooling of vehicles components**			
2.2 Owner of the courses				**Associate professor Otilia Nedelcu**			
2.3 Owner of the tutorial classes				**Associate professor Otilia Nedelcu**			
2.4 Year of study	II	2.5 Semester	I	2.6 Type of evaluation	E	2.7 Status of the discipline	Compulsory

3. Estimated total time (hours of academic activities in a semester)

3.1 Number of hours in a week	3	of which: 3.2 course	1	3.3 tutorial class/lab	1L/1P
3.4 Total of hours in the curricula	42	of which: 3.5 course	14	3.6 tutorial class/lab	28

Distribution of the effective time	hours
Study according to manual, course support, bibliography and notes	10
Additional documentation in the library, on specialized electronic platforms and in the field	16
Tutorial class preparation/labs, homeworks, papers, portfolios and essays	15
Tutela	15
Examinations	2
Other activities	0
3.7 Total hours of individual study	**58**
3.9 Total hours in a semester	**100**
3.10 Number of credits	**4**

4. Preconditions (if case)

4.1 of curriculum	LET 3 B S 04 - Hydraulic bases, LEI 3 B D 03 – Electromechanical convertors LET 4 O S 04 – Special Electrical Machines
4.2 of competences	A good knowledge of basic techniques for the elaboration of project

5. Conditions (if case)

5.1 for course development Regular course classroom (25 places, video projector)
5.2 for tutorial class/project development Regular course classroom (25 places, 8 computers)

6. Specific cumulated competences

Professional competencies	**C1.1** Theoretical concepts regarding vehicles integrated electrical systems, vehicle principles and architecture, materials used to manufacture them, environmental impact, cooling or heating of electrical components. **C1.3** Capability of thematic documentation, identifying the existing situation and requirements and interpreting previous achievements. **C1.4** Correctly define objectives and achieve realistic work plans **C1.5** The ability to analyse multiple alternative methods or solutions for choosing the most advantageous techno-economic compromise. **C1.6** The description based on mathematical models, of the vehicles integrated electrical systems operation, together with the justification for the choice of materials used for their manufacture, the manufacturing technologies, the modes for cooling or heating the electrical components and the impact on the environment. **C2.1** Theoretical and practical concepts of electric and electromechanical systems command and control, modelling, simulation and testing of the electric propulsion system, power electronics components, thermal sub-assemblies regime, in the field of vehicles integrated electrical systems, using software and hardware resources. **C2.2** Interpretation of the phenomena specific to the operation of vehicles integrated electrical systems, based on testing, command analysis, thermal regime analysis and electric propulsion system analysis using software and hardware resources. **C2.3** The ability to respond to the demands of the specialized market by developing professional projects and proposing innovative technical solutions, making efficient use of existing solutions. **C2.6** Identification and sizing of the main constructive and functional elements in the vehicles integrated electrical systems by analysing the control, analysis, modelling and simulation of electrical, electromechanical and power electronic systems, the heating and cooling of components, by using dedicated software and hardware.
Transversal competencies	CT1 Identifying the requirements, resources, processes, deadlines and risks necessary to prepare the execution plan and to carry out the professional and organizational tasks in compliance with the ethical norms agreed by the society. CT3 Self-control and planning of training needs, efficient use of information and communication resources, and assisted training (Internet portals, specialized software applications, databases, on-line courses, etc.) to meet the personal career development plan. CT4 Creative application of research techniques and solving specific problems related to the vehicles integrated electrical systems engineering.

7. Purposes of the discipline (according to the specific cumulated competences grid)

7.1 General purposes of the discipline	The overall objective of the course is to deepen knowledge of the heating and cooling phenomena that occur in electrical vehicle systems.
7.2 Specific purposes	• Applying the concepts, theories and fundamental investigation methods and their optimization • Understand the concept of electric vehicle thermal management systems

8. Contents

8.1 Course	Teaching method	Observations
Chapter I. Characteristics of fluid used for cooling in electrical vehicles systems	Lecture	3 hours
Chapter II. Heating / cooling electrical engines	Lecture, problematization, debate, heuristic dialogues	4 hours
Chapter III. Heating / cooling batteries for electrical vehicle	Lecture, problematization, debate, heuristic dialogues	4 hours
Chapter IV. Pump Air Conditioning Systems for Electric Vehicles	Lecture, problematization, debate	3 hours

Bibliography:

1. O. Nedelcu - Modelarea proceselor de incalzire si ventilatie a masinilor electrice, Ed. Bibliotheca, Targoviste, 2010
2. O. Nedelcu, C.I. Salisteanu - "Heat Transfer / Book 2, Calculation methods for heating and ventilation system of electrical machines" Ed. INTECH ISBN: 980-953-307-494-3, 2013
3. JILING LI, ZHEN ZHU - Battery Thermal Management Systems of Electric Vehicles, CHALMERS UNIVERSITY OF TECHNOLOGY, Göteborg, Sweden 2014
4. Jokar, A.; Hosni, M.H.; Eckels, S.J. New Generation Integrated Automotive Thermal System; SAE Technical Paper No. 2005-01-3476; SAE International: Warrendale, PA, USA, 2005.
5. Qinghong Peng and Qungui Du, Progress in Heat Pump Air Conditioning Systems for Electric Vehicles—A Review, Energies — Open Access Energy Research, Engineering and Policy Journal, 2016
6.

8.2 Tutorial class/lab	Teaching methods	Observations
P.I. The modeling heating/cooling in electrical engine	Lecture, problematization	7 hours
P.II. The modeling heating/cooling of batteries for electric vehicles	Lecture, problematization, debate, dialogues	7 hours
L1.L2. Recognition of piping flow regime	Lecture, problematization, debate, dialogues	4 hours
L3, L4. Calculating the heating of an asynchronous electric motor	Lecture, problematization, debate, dialogues	4 hours
L5.L6.L7. Calculating aerodynamic resistances in a wind tunnel	Lecture, problematization, debate, dialogues	6 hours

Bibliography:

1. O. Nedelcu - Modelarea proceselor de incalzire si ventilatie a masinilor electrice, Ed. Bibliotheca, Targoviste, 2010
2. O. Nedelcu, C.I. Salisteanu - "Heat Transfer / Book 2, Calculation methods for heating and ventilation system of electrical machines" Ed. INTECH ISBN: 980-953-307-494-3, 2013
3. Wang, X.J. Application of low-temperature heat pump technology in rail vehicle air conditioning. Mech. Electr. Eng. Technol. 2011, 40, 165–168.

9. Corroboration of the discipline's contents with the expectations of epistemical community's representatives, professional associations and representative employers in the domain associated to the program

The course develops competences which facillitate a better understanding of topics, concepts and theories relating to Thermal Management in electrical vehicles, which play an essential part in the advanced instruction of energy engineer, electrical engineer, automatization engineer etc.

10. Evaluations

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Weight in the final grade
10.4 Course	Knowledge of aspects of vehicle heating and cooling components (motor, batteries, circuits).	Exam	40%
10.5 Tutorial class/lab	The capacity to accomplish individual documentation research in the frame of restricted autonomy and qualified assistance	Evaluation essay/book review	20%
	Correct solving of the specifically problems in project theme	The project evaluations	40%
10.6 Minimal standard of performance			
Acquirement of the competences and abilities previously mentioned at a minimum level of 5			

Date of completion
1.09.2021

Signature of the course's professor
Assoc. Prof. Dr. Otilia Nedelcu

Signature of the tutorial class professor
Assoc. Prof. Dr. Otilia Nedelcu

Signature of the Head of Department,
Assoc. Prof. Mihai Bizoi

Date of the approval in the department
27.09.2021

VALAHIA UNIVERSITY OF TARGOVISTE
FACULTY OF ELECTRICAL ENGINEERING, ELECTRONICS AND INFORMATIONAL TECHNOLOGY
AUTOMATION, INFORMATION AND ELECTRICAL ENGINEERING DEPARTMENT

SYLLABUS

1. Information about the program

1.1 Higher education institution	**Valahia University of Targoviste**
1.2 Faculty/Department	**Faculty of Electrical Engineering, Electronics and Informational Technology**
1.3 Department	**Automation, Information and Electrical Engineering Department**
1.4 Domain of study	**Electrical Engineering**
1.5 Cycle of study	**Master**
1.6 Studies program/Qualification	**Integrated Electrical Systems Engineering in Vehicles**

2. Information about the discipline

2.1 Name of the discipline				**Power electronics. Structure and control methods**			
2.2 Owner of the courses				**Associate Professor Oliver Magdun**			
2.3 Owner of the tutorial/lab classes				**Associate Professor Oliver Magdun**			
2.4 Year of study	II	2.5 Semester	I	2.6 Type of evaluation	E	2.7 Status of the discipline	Compulsory

3. Estimated total time (hours of academic activities in a semester)

3.1 Number of hours in a week	3	of which: 3.2 course	2	3.3 tutorial class/lab	1
3.4 Total of hours in the curricula	42	of which: 3.5 course	28	3.6 tutorial class/lab	14

Distribution of the effective time	hours
Study according to manual, course support, bibliography and notes	15
Additional documentation in the library, on specialized electronic platforms and in the field	15
Tutorial class preparation/labs, homeworks, papers, portfolios and essays	15
Tutela	10
Examinations	3
Other activities	
3.7 Total hours of individual study	**58**
3.9 Total hours in a semester	**100**
3.10 Number of credits	**4**

4. Preconditions (if case)

4.1 of curriculum	LET 2 B F 02 – Numerical Methods LET 2 B F 03- Fundamentals of Electrotechnics LET 3 B D 10 – Electrical Drives LET 3 B S 03 – Electromecanichal Converters LET 4 O S 04 – Special Electrical Machines
4.2 of competences	Good ability to think mathematically and logically

5. Conditions (if case)

5.1 for course development Regular course classroom (minimum 30 places, video projector)
5.2 for tutorial class/lab development Laboratory (25 - 30 places)

6. Specific cumulated competences

Professional competencies	**C1.2** Understand and interpret the phenomena specific to the normal and limit regimes operation of the electrical systems integrated in the vehicles. **C1.3** Capability of thematic documentation, identifying the existing situation and requirements and interpreting previous achievements. **C1.4** Correctly define objectives and achieve realistic work plans **C1.5** The ability to analyse multiple alternative methods or solutions for choosing the most advantageous techno-economic compromise. **C2.1** Theoretical and practical concepts of electric and electromechanical systems command and control, modelling, simulation and testing of the electric propulsion system, power electronics components, thermal sub-assemblies regime, in the field of vehicles integrated electrical systems, using software and hardware resources. **C2.2** Interpretation of the phenomena specific to the operation of vehicles integrated electrical systems, based on testing, command analysis, thermal regime analysis and electric propulsion system analysis using software and hardware resources. **C2.3** The ability to respond to the demands of the specialized market by developing professional projects and proposing innovative technical solutions, making efficient use of existing solutions. **C2.4** Critical analyses to highlight the advantages and the competitiveness of new solutions of integrated electrical systems developed in relation to the existing offers on the market **C2.5** The ability to ensure the technological transfer of new technical solutions in the field of integrated electrical systems. **C2.6** Identification and sizing of the main constructive and functional elements in the vehicles integrated electrical systems by analysing the control, analysis, modelling and simulation of electrical, electromechanical and power electronic systems, the heating and cooling of components, by using dedicated software and hardware. **C5.2** Developing solutions through the use of specialized knowledge for modelling, testing and numerical simulation of the components of electrical systems integrated into vehicles behaviour. **C8.2** Creative use of knowledge for the performance and characteristics of vehicle-specific systems testing. **C8.3** Development of the conceptual and methodological set for increasing the individual work capacity in order to achieve specific tasks for the industry. **C8.4** The ability to evaluate complex problems and to communicate demonstratively the results of their own assessment.
Transversal competencies	CT2 Sharing roles and responsibilities in a team, performing leadership roles, coordinating the work, taking responsibility for the decisions, and establishing a communication strategy. CT3 Self-control and planning of training needs, efficient use of information and communication resources, and assisted training (Internet portals, specialized software applications, databases, on-line courses, etc.) to meet the personal career development plan.

7. Purposes of the discipline (according to the specific cumulated competences grid)

7.1 General purposes of the discipline	Knowledge of the most significant configurations and technologies of DC and AC drives Understanding the fundamentals of drives control
7.2 Specific purposes	Understanding the principle of torque control of DC and AC drives with applications in the electric vehicles Using the proper tools to deal with DC and AC drives in electric vehicles

8. Contents

8.1 Course	Teaching method	Observations
Basics of designing controllers for drives applied to electric vehicles. Motion control	Lecture	2 hours
Semiconductor power devices. Structure and control methods	Lecture	4 hours
Tools to deal with DC drives - Converters for DC drives	Lecture	4 hours
Control of DC drives	Lecture	2 hours
Tools to deal with AC drives - Space vectors - Converters for AC drives	Lecture	4 hours
Control of Induction Machine (IM): - Field oriented control of IM - Direct torque control of IM	Lecture	4 hours
Control of permanent magnet synchronous machine	Lecture	2 hours
Control of reluctance synchronous machine	Lecture	4 hours
Control of brushless DC motors	Lecture	2 hours

Bibliography:

A. Emadi, Handbook of Automotive Power Electronics and Motor Drives, Publisher: CRC Press 2005
R. Hodkinson, J. Fenton, Lightweight Electric/ Hybrid Vehicle Design, Publisher: Butterworth-Heinemann, 2001
B. K. Bose, Power Electronics and Motor Drives: Advances and Trends, Publisher: Elsevier 2006
P. Mutchler, Control of Drives - Lecture notes, TU Darmstat, 2010
N. Mohan, Advanced Electric Drives: Analysis, Control, and Modeling Using MATLAB / Simulink, Publisher: Willey 2014

8.2 Tutorial class /Lab	Teaching methods	Observations
Control of DC motor drives	Laboratory experiments and simulations	2 hours
Control of brushless DC motor drives	Laboratory experiments and simulations	3 hours
Control of induction motor drives	Laboratory experiments and simulations	3 hours
Control of permanent magnet synchronous machine drives	Laboratory experiments and simulations	3 hours
Control of switched reluctance machine drives	Laboratory experiments and simulations	3 hours

Bibliography:

C. M. Ong, Dynamic Simulations of Electric Machinery: Using MATLAB/SIMULINK, Publisher: Prentice Hall, 1988
Motor Control and Drive, http://www.microchip.com/design-centers
Hybrid/Electric Power Train Systems, http://www.ti.com/lsds/ti/applications/automotive
Motor Control, http://www.atmel.com/applications

9.Corroboration of the discipline's contents with the expectations of epistemical community's representatives, professional associations and representative employers in the domain associated to the program

The course develops specific abilities to deal with the newest technologies used in the electric vehicles.

10. Evaluations

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Weight in the final grade
10.4 Course	A set of questions, which covers the lecture topics, are addressed to students for testing their knowledge.	Exam	25%
	Several exercises have to be solved by students during the examination.	Exam	25%

10.5 Tutorial class/lab	The team work and the ability to prepare technical reports is verified.	Laboratory reports evaluation	30%
	Active participation during laboratories and capacity to offer proper solutions in case of the drive failures is considered.	Permanent evaluation	20%
10.6 Minimal standard of performance			
Acquirement of competences as previously mentioned at a minimum level of 5			

Date of completion
1.09.2021

Signature of the course's professor
Associate Professor Oliver Magdun

Signature of the tutorial/lab class professor
Associate Professor Oliver Magdun

Date of the approval in the department
27.09.2021

Signature of the Head of Department,
Assoc. Prof. Mihai BIZOI

VALAHIA UNIVERSITY OF TARGOVISTE
FACULTY OF ELECTRICAL ENGINEERING, ELECTRONICS AND INFORMATIONAL TECHNOLOGY
AUTOMATION, INFORMATION AND ELECTRICAL ENGINEERING DEPARTMENT

SYLLABUS

1. Information about the program

1.1 Higher education institution	**VALAHIA UNIVERSITY OF TARGOVISTE**
1.2 Faculty/Department	**Faculty of Electrical Engineering, Electronics and Informational Technology**
1.3 Department	**Automation, Information And Electrical Engineering Department**
1.4 Domain of study	**Electrical Engineering**
1.5 Cycle of study	**Master**
1.6 Studies program/Qualification	**Integrated Electrical Systems Engineering in Vehicles**

2. Information about the discipline

2.1 Name of the discipline				**Integration of Electric Vehicles in Smart Grids**			
2.2 Owner of the courses				**Assoc. Prof. Ioan Corneliu Sălișteanu**			
2.3 Owner of the tutorial classes				**Assoc. Prof. Ioan Corneliu Sălișteanu**			
2.4 Year of study	II	2.5 Semester	I	2.6 Type of evaluation	E	2.7 Status of the discipline	Compulsory

3. Estimated total time (hours of academic activities in a semester)

3.1 Number of hours in a week	3	of which: 3.2 course	2	3.3 tutorial class/lab	1L
3.4 Total of hours in the curricula	42	of which: 3.5 course	28	3.6 tutorial class/lab	14

Distribution of the effective time	hours
Study according to manual, course support, bibliography and notes	10
Additional documentation in the library, on specialized electronic platforms and in the field	15
Tutorial class preparation/labs, homework, papers, portfolios and essays	15
Tutela	15
Examinations	3
Other activities	-
3.7 Total hours of individual study	**58**
3.9 Total hours in a semester	**100**
3.10 Number of credits	**4**

4. Preconditions (if case)

4.1 of curriculum	IESEV1BA06 - Electric propulsion systems for EV LET 1 B F 05 - Computer Programming and Programming Languages LET 2 B D 03 - Theoretical electrical Engineering LET 4 O S 15 – Electrical networks

4.2 of competences	Theoretical electrical Engineering, Matrix calculations, MATLAB programming, Electric vehicle structures and components, Charging and discharging modes, State of charge estimation.

5. Conditions (if case)

5.1 for course development Classroom with large blackboards, Computer connected to a header projector with large external screen.
5.2 for tutorial class/project development Computer laboratory (or availability of laptops for each student), Matlab software with toolboxes.

6. Specific cumulated competences

Professional competences	**C3.1** Theoretical and practical concepts of electric vehicle capabilities, object-oriented software development, communication protocols, acquisition and processing of data, vehicle behaviour analysis as part of Smart Grid, in the field of vehicles integrated electrical systems. **C3.2** Use of specialized knowledge for software development, communications, data acquisition and processing, capabilities and interconnected operation in the field of vehicles integrated electrical systems. **C3.3** Using the conceptual and methodological set for the development of new software solutions and professional projects in order to ensure an adequate flow of information and the fulfilment of the specific requirements of the specialized standards. **C3.4** Development and analysis of software solutions, communications and operational safety for new projects. **C3.5** The ability to develop technically and economically optimized software, communications and operational solutions, in the field of integrated electrical systems **C3.6** Solving an operational and analysing problem of a vehicles integrated electrical system that uses object-oriented software, interfaces and communication protocols specific to data acquisition and processing, respecting the safety principles in operation. **C5.1** Specific design concepts based on modelling and numerical simulation of the interactions and behaviour of components of vehicles integrated electrical systems. **C5.2** Developing solutions through the use of specialized knowledge for modelling, testing and numerical simulation of the components of electrical systems integrated into vehicles behavior. **C5.3** The ability to accomplish numerical models for analysis, modelling, testing and simulation of the components behaviour of an electrical system.
Transversal competences	CT2 Sharing roles and responsibilities in a team, performing leadership roles, coordinating the work, taking responsibility for the decisions, and establishing a communication strategy. CT3 Self-control and planning of training needs, efficient use of information and communication resources, and assisted training (Internet portals, specialized software applications, databases, on-line courses, etc.) to meet the personal career development plan. CT4 Creative application of research techniques and solving specific problems related to the vehicles integrated electrical systems engineering.

7. Purposes of the discipline (according to the specific cumulated competences grid)

7.1 General purposes of the discipline	- Contribute to the formation of new specialists in the emergent interdisciplinary area of electric vehicle applications. - Increase the awareness on the transition to more electrical technologies for transportations.
7.2 Specific purposes	- Provide knowledge on the way electric vehicles interact with the distributed energy resources and the electrical grid. - Explain the opportunities and constraints of using electric vehicles in grid-connected mode. - Illustrate how to take into account the diffusion of electric vehicles into planning schemes involving the electrical grid.

8. Contents

8.1 Course	Teaching method	Observations
Introduction to the sectors of the electrical system (production transmission, distribution and utilization). Distribution system representation and analysis: type of structures, conductors, models of lines and transformers, per unit (pu) representation. Representation of the MV distribution system: Laplacian matrix, Adjacent matrix and Gamma matrix. Load types (industrial, residential, tertiary), modelling (ZIP model) and their representation (load profiles). Power flow calculation by BFS (Backward Forward Sweep).	Presentation of the concepts and interactive lecture.	5 hours
Smart grid terminology: DG, DS, DR, DER, RES acronyms and concepts. Problems with excess of DER: operational constraints, reverse power flow. Possible use of EVs in solving the problems due to the excess of DER: V2G vs G2V. Penetration of DER and robustness of the system. Use of DGs (or DS): backup, peak shaving, net metering. Frequency regulation concepts: swing equation, reserves and limits for the inverters. Self-sufficiency and self-consumption. Hosting capacity. Electricity market: Energy market and ancillary service market.	Presentation of the concepts and interactive lecture.	5 hours
Islanding and microgrids. Aggregators. Virtual power plants and energy hubs. Storage systems: efficiency, SOC, DOD, types of services offered. Connection of the storage systems.	Presentation of the concepts and interactive lecture.	4 hours
Type of electric vehicles: HEV, PHEV, BEV, RXBEV, FCBEV. Type of charging and connections: IEC 62196, IEC 61851. Energy vs Communication: the various V2X acronym. Impact of the EV diffusion on distribution systems: problems caused, multi-layer approach, traffic models, agent-based models. Examples taken from literatures: charging and discharging strategies, operational scheduling.	Presentation of the concepts and interactive lecture.	8 hours
Planning with EVs: operational planning and expansion planning. Examples taken from literature: EV integration with non-programmable renewable generation.	Presentation of the concepts and interactive lecture.	6 hours
8.2 Tutorial class/lab	Teaching methods	Observations
Computer laboratories: use of computational tools for distribution system analysis with DERs and EVs.	Activity in the computer laboratory with use of programming languages and tools.	28 hours

Bibliography:

1. Distributed Generation, N. Jenkins, G. Strbac and J. Ekanayake, 2010, ISBN: 978-0-86341-958-4
2. Electric vehicles and the electric grid: A review of modeling approaches, Impacts, and renewable energy integration, David B. Richardson, Elsevier - Renewable and Sustainable Energy Reviews Volume 19, March 2013, Pages 247–254
3. IEC 61851, Electric vehicle conductive charging system, 2017
4. IEC 62196, Plugs, socket-outlets, vehicle connectors and vehicle inlets – Conductive charging of electric vehicles
5. Distribution System Modeling and Analysis, W.H. Kersting, Third Edition, 2016
6. Electric Vehicles Integration in the Electric Power System with Intermittent Energy Sources -The Charge/Discharge infrastructure, L. Marra, PhD Thesis, orbit.dtu.dk/files/77584108/PhD_thesis_final_.PDF

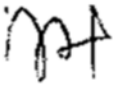
9. Corroboration of the discipline's contents with the expectations of epistemically community's representatives, professional associations and representative employers in the domain associated to the program

The course develops competences to facilitate better understanding of concepts, theories and applications related to the integration of electrical vehicles in the electrical distribution networks. These topics play an essential part in the advanced instruction of energy engineers, electrical engineers, automation engineers, as most of the concepts addressed are emerging in the current context of electrification of the vehicle technologies. The systematic collection of these contents into a dedicated course is quite new, and covers the need to form novel interdisciplinary experts in the domain of electric vehicle applications.

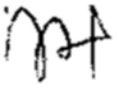
10. Evaluations

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Weight in the final grade
10.4 Course	Correctness of the responses	Written exam	60%
10.5 Tutorial class/lab	Homework, tests	Evaluation essay/book review	20%
	Analysing and interpretation of data collected during lab experiments	The laboratory evaluations	20%
10.6 Minimal standard of performance			
Acquirement of the competences and abilities previously mentioned at a minimum level of 5			

Signature of the course's professor
Assoc.Prof. Corneliu SALISTEANU



Signature of the tutorial class professor
Assoc.Prof. Corneliu SALISTEANU



Date of completion
1.09.2021

Signature of the Head of Department,
Assoc. Prof. Mihai Bizoi

Date of the approval in the department
27.09.2021

VALAHIA UNIVERSITY OF TARGOVISTE
FACULTY OF ELECTRICAL ENGINEERING, ELECTRONICS AND INFORMATIONAL TECHNOLOGY
AUTOMATION, INFORMATION AND ELECTRICAL ENGINEERING DEPARTMENT

SYLLABUS

1. Information about the program

1.1 Higher education institution	**Valahia University of Targoviste**
1.2 Faculty/Department	**Faculty of Electrical Engineering, Electronics and Informational Technology**
1.3 Department	**Automation, Information and Electrical Engineering Department**
1.4 Domain of study	**Electrical Engineering**
1.5 Cycle of study	**Master**
1.6 Studies program/Qualification	**Integrated Electrical Systems Engineering in Vehicles**

2.Information about the discipline

2.1 Name of the discipline				**Virtual Testing and Validation**			
2.2 Owner of the courses				-			
2.3 Owner of the tutorial classes				Lecturer Cosmin COBIANU			
2.4 Year of study	II	2.5 Semester	I	2.6 Type of evaluation	C	2.7 Status of the discipline	Compulsory

3. Estimated total time (hours of academic activities in a semester)

3.1 Number of hours in a week	3	of which: 3.2 course	0	3.3 tutorial class/lab	3
3.4 Total of hours in the curricula	42	of which: 3.5 course	0	3.6 tutorial class/lab	42

Distribution of the effective time	hours
Study according to manual, course support, bibliography and notes	15
Additional documentation in the library, on specialized electronic platforms and in the field	15
Tutorial class preparation/labs, homeworks, papers, portfolios and essays	15
Tutela	10
Examinations	3
Other activities	-
3.7 Total hours of individual study	58
3.9 Total hours in a semester	**100**
3.10 Number of credits	**4**

4. Preconditions (if case)

4.1 of curriculum	
4.2 of competences	

5. Conditions (if case)

5.1 for course development -
5.2 for tutorial class/lab development

6. Specific cumulated competences

Professional competencies	**C1.1** Theoretical concepts regarding vehicles integrated electrical systems, vehicle principles and architecture, materials used to manufacture them, environmental impact, cooling or heating of electrical components. **C1.3** Capability of thematic documentation, identifying the existing situation and requirements and interpreting previous achievements. **C1.4** Correctly define objectives and achieve realistic work plans **C1.5** The ability to analyse multiple alternative methods or solutions for choosing the most advantageous techno-economic compromise. **C6.3** Using and implementing the principles of Systems Engineering in vehicles integrated electrical systems. **C6.4** Properly defining the objectives to be achieved in systems engineering specific project and the development of work plans. **C8.1** Specific concepts regarding methodologies, procedures and project elaboration, studies and team or individual reports for the purpose of design, virtual testing and implementation of electrical systems for vehicles. **C8.2** Creative use of knowledge for the performance and characteristics of vehicle-specific systems testing. **C8.3** Development of the conceptual and methodological set for increasing the individual work capacity in order to achieve specific tasks for the industry. **C8.4** The ability to evaluate complex problems and to communicate demonstratively the results of their own assessment. **C8.5** Ability to conduct individual or team projects in the field of vehicles integrated electrical systems. **C8.6** The ability to properly analyse and model electrical systems, design, testing and validate the solutions proposed for vehicles integrated electrical systems.
Transversal competencies	CT3 Self-control and planning of training needs, efficient use of information and communication resources, and assisted training (Internet portals, specialized software applications, databases, on-line courses, etc.) to meet the personal career development plan. CT 4 Creative application of research techniques and solving specific problems related to the vehicles integrated electrical systems engineering.

7. Purposes of the discipline (according to the specific cumulated competences grid)

7.1 General purposes of the discipline	• Subject objective consist of assimilation by the student of the specific tools of the scientific research and practice: documentation techniques, acquisition techniques, experimental processing and interpretation, principles of development of research reports, multimedia presentation techniques, etc.
7.2 Specific purposes	• Elaboration of studies, reports and synthesis of documentation, respectively technical-economic; • Solving specific design research problems in the field of integrated electrical systems engineering in vehicles • Achievement of experimental research with the use of modern equipment • Elaboration of the practical works being part of a team in the frame of complex projects

8.Contents

8.1 Course	Teaching method	Observations
8.2 Tutorial class/lab	Teaching methods	Observations
• Independent realization of a documentary on a theme related to the subject of the dissertation		42 h
• Performing experiments related to the given theme		
• Writing a research report		
• Making a public presentation of the work		
Bibliography:		

9.Corroboration of the discipline's contents with the expectations of epistemical community's representatives, professional associations and representative employers in the domain associated to the program

In order to draft the contents, to select the teaching/learning methods, the lecturer has organized meetings with members of Renault and other organizations, that are specialized in the field of Integrated Electrical Systems Engineering in Vehicles, and also in the field of technologies and equipment that are involved within the design and testing processes of automotive industry; meetings with representatives of public institutions (ministries, local authorities etc.); and meetings with other academic teachers in the field. The meeting has aimed the identification of the requirements and the expectations of employers in the field, and also to synchronize the syllabus with similar programs that are developed within other academic institutions.

10. Evaluations

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Weight in the final grade
10.4 Course			
10.5 Tutorial class/lab	Activity during the semester	Written and oral evaluation	80%
	Final colloquy	Oral evaluation	20%
10.6 Minimal standard of performance			
Acquirement of the competences and abilities previously mentioned at a minimum level of 5			

Date of completion
1.09.2021

Signature of the course's professor

Signature of the tutorial class professor
Lecturer Cosmin COBIANU

Date of the approval in the department
27.09.2021

Signature of the Head of Department,
Assoc. Prof. Mihai BIZOI

VALAHIA UNIVERSITY OF TARGOVISTE
FACULTY OF ELECTRICAL ENGINEERING, ELECTRONICS AND INFORMATIONAL TECHNOLOGY
AUTOMATION, INFORMATION AND ELECTRICAL ENGINEERING DEPARTMENT

SYLLABUS

1. Information about the program

1.1 Higher education institution	**Valahia University of Targoviste**
1.2 Faculty/Department	**Faculty of Electrical Engineering, Electronics and Informational Technology**
1.3 Department	**Automation, Information And Electrical Engineering Department**
1.4 Domain of study	**Electrical Engineering**
1.5 Cycle of study	**Master**
1.6 Studies program/Qualification	**Integrated Electrical Systems Engineering in Vehicles**

2.Information about the discipline

2.1 Name of the discipline				**Vehicles environmental impact**			
2.2 Owner of the courses				**Professor Daniel DUNEA**			
2.3 Owner of the tutorial classes				**Professor Daniel DUNEA**			
2.4 Year of study	II	2.5 Semester	II	2.6 Type of evaluation	E	2.7 Status of the discipline	Compulsory

3. Estimated total time (hours of academic activities in a semester)

3.1 Number of hours in a week	3	of which: 3.2 course	2	3.3 tutorial class/sem	1
3.4 Total of hours in the curricula	42	of which: 3.5 course	28	3.6 tutorial class/sem	14

Distribution of the effective time	hours
Study according to manual, course support, bibliography and notes	10
Additional documentation in the library, on specialized electronic platforms and in the field	15
Tutorial class preparation/labs, homeworks, papers, portfolios and essays	15
Tutela	15
Examinations	3
Other activities	0
3.7 Total hours of individual study	**58**
3.9 Total hours in a semester	**100**
3.10 Number of credits	**4**

4. Preconditions (if case)

4.1 of curriculum	
4.2 of competences	A good knowledge of basic techniques for the elaboration of essays, book reviews, synthetic papers

5. Conditions (if case)

5.1 for course development - Regular course classroom (25 places, video projector)
5.2 for tutorial class/lab development- Regular course classroom (25 places, video projector)

6. Specific cumulated competences

Professional competencies	**C1.1** Theoretical concepts regarding vehicles integrated electrical systems, vehicle principles and architecture, materials used to manufacture them, environmental impact, cooling or heating of electrical components. **C1.3** Capability of thematic documentation, identifying the existing situation and requirements and interpreting previous achievements. **C1.4** Correctly define objectives and achieve realistic work plans **C1.5** The ability to analyse multiple alternative methods or solutions for choosing the most advantageous techno-economic compromise. **C1.6** The description based on mathematical models, of the vehicles integrated electrical systems operation, together with the justification for the choice of materials used for their manufacture, the manufacturing technologies, the modes for cooling or heating the electrical components and the impact on the environment. **C8.1** Specific concepts regarding methodologies, procedures and project elaboration, studies and team or individual reports for the purpose of design, virtual testing and implementation of electrical systems for vehicles. **C8.4** The ability to evaluate complex problems and to communicate demonstratively the results of their own assessment.
Transversal competencies	CT1 Identifying the requirements, resources, processes, deadlines and risks necessary to prepare the execution plan and to carry out the professional and organizational tasks in compliance with the ethical norms agreed by the society. CT3 Self-control and planning of training needs, efficient use of information and communication resources, and assisted training (Internet portals, specialized software applications, databases, on-line courses, etc.) to meet the personal career development plan.

7. Purposes of the discipline (according to the specific cumulated competences grid)

7.1 General purposes of the discipline	A good knowledge of the problematic, methods and concepts specific to vehicles impact on environment
7.2 Specific purposes	Knowledge of the major problematics in Environmental protection and sustainable development principles. Knowledge of the main scientific aspects of vehicles impact on ecosystems.

8.Contents

8.1 Course	Teaching method	Observations
Environmental Impact		
Production and Destruction	Lecture, problematization, debate	2
The environmental impact on a single car	Lecture, problematization	2
Conventional Pollutants		
Vehicle Pollutants, Air Quality, and Damages	Lecture, problematization, debate	6
Car emissions and Global Warming	Lecture, problematization	4
The impact on biodiversity conservation	Lecture, problematization	4
Vehicles and the Urban Environment		
The impact on urban ecosystems	Lecture, problematization	4
The Vehicle's Imprint on the Landscape	Lecture, problematization, debate	4
Strategy for sustainable development	Lecture, problematization	2
8.2 Tutorial class/lab	**Teaching methods**	**Observations**
Types of environmental impacts	Lecture, problematization	4
Introduction in Environmental Policy and Planning	Lecture, problematization, debate	2
Study shows electric cars bring environmental benefits	Lecture, problematization	4
Causes of environmental impacts	Lecture, problematization	4
Bibliography: 1. Bishop, Gary A., and D.H. Stedman. 1996. Motor Vehicle Emissions Variability. Journal of the Air and		

Waste Management Association 46(7): 667– 675.
2. Derek Elsom, *Smog Alert: Managing Urban Air Quality* (London: Earthscan Publications, 1996). The book provides good detail and some useful case studies on ways to manage automobiles in order to limit air pollution. Largely dealing with non-US examples, however.
3. Deborah Gordon, *Steering a New Course: Transportation, Energy, and the Environment* (Washington, DC: Island Press, 1991). A solid critique on transport and energy use with substantial statistical data.
4. Gabriela Teodorescu, *The impact of anthropization on urban ecosystems*. Ed. Ceres, 2008
5. McConnell, Virginia D. 1990. Costs and Benefits of Vehicle Emission Inspection: A Case Study of the Maryland Region. Journal of Environmental Management 30 (Winter): 1–15.

9.Corroboration of the discipline's contents with the expectations of epistemical community's representatives, professional associations and representative employers in the domain associated to the program

The course develops competences that facilitate a better understanding of topics, to generate environmental and social impacts. This course targets student-seeking careers in alternative mobility systems who want to understand the interaction of vehicles on environment.

10. Evaluations

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Weight in the final grade
10.4 Course	An adequate use of key concepts of Environmental Protection	Exam	20%
	A good knowledge of the main effects on ecosystems.	Exam	20%
	A good knowledge of the fundamental conditions for sustainable development implementation	Exam	20%
10.5 Tutorial class/lab	Correct solving of the specifically problems in project theme	The project evaluations	40%
10.6 Minimal standard of performance			
Acquirement of the competences and abilities previously mentioned at a minimum level of 5			

Date of completion
1.09.2021

Signature of the course's professor
Professor Daniel DUNEA

Signature of the tutorial class professor
Professor Daniel DUNEA

Date of the approval in the department
27.09.2021

Signature of the Head of Department,
Assoc. Prof.Mihai BIZOI

VALAHIA UNIVERSITY OF TARGOVISTE
FACULTY OF ELECTRICAL ENGINEERING, ELECTRONICS AND INFORMATION TECHNOLOGY
AUTOMATION, INFORMATION AND ELECTRICAL ENGINEERING DEPARTMENT

SYLLABUS

1. Information about the program

1.1 Higher education institution	**Valahia University of Targoviste**
1.2 Faculty/Department	**Faculty of Electrical Engineering, Electronics and Informational Technology**
1.3 Department	**Automation, Information and Electrical Engineering Department**
1.4 Domain of study	**Electrical Engineering**
1.5 Cycle of study	**Master**
1.6 Studies program/Qualification	**Integrated Electrical Systems Engineering in Vehicles**

2.Information about the discipline

2.1 Name of the discipline				**Electric Vehicles Capabilities**			
2.2 Owner of the courses				**Assoc. Prof. Otilia DRAGOMIR**			
2.3 Owner of the tutorial classes				**Assoc. Prof. Otilia DRAGOMIR**			
2.4 Year of study	**II**	2.5 Semester	**II**	2.6 Type of evaluation	**E**	2.7 Status of the discipline	Compulsory

3. Estimated total time (hours of academic activities in a semester)

3.1 Number of hours in a week	2	of which: 3.2 course	1	3.3 tutorial class/lab	1L
3.4 Total of hours in the curricula	28	of which: 3.5 course	14	3.6 tutorial class/lab	14

Distribution of the effective time	hours
Study according to manual, course support, bibliography and notes	10
Additional documentation in the library, on specialized electronic platforms and in the field	10
Tutorial class preparation/labs, homeworks, papers, portfolios and essays	15
Tutela	10
Examinations	2
Other activities	
3.7 Total hours of individual study	**47**
3.9 Total hours in a semester	**75**
3.10 Number of credits	**3**

4. Preconditions (if case)

4.1 of curriculum	IESEV 1 B S 01 - Vehicles principles and architecture IESEV 1 B A 04 -Automative Electronics IESEV 1 B A 06 - Electric propulsion systems for EV
4.2 of competences	A good knowledge of EV architecture and electronic components. A good knowledge of notions the e-drive, e-storage and e-charging.

5. Conditions (if case)

5.1 for course development Regular course classroom (25 places, video projector)
5.2 for tutorial class/lab development Regular course classroom (25 places, PCs with Matlab/Simulink, video projector)

6. Specific cumulated competences

Professional competencies	**C3.1** Theoretical and practical concepts of electric vehicle capabilities, object-oriented software development, communication protocols, acquisition and processing of data, vehicle behaviour analysis as part of Smart Grid, in the field of vehicles integrated electrical systems. **C3.2** Use of specialized knowledge for software development, communications, data acquisition and processing, capabilities and interconnected operation in the field of vehicles integrated electrical systems. **C3.3** Using the conceptual and methodological set for the development of new software solutions and professional projects in order to ensure an adequate flow of information and the fulfilment of the specific requirements of the specialized standards. **C3.4** Development and analysis of software solutions, communications and operational safety for new projects. **C3.5** The ability to develop technically and economically optimized software, communications and operational solutions, in the field of integrated electrical systems **C3.6** Solving an operational and analysing problem of a vehicles integrated electrical system that uses object-oriented software, interfaces and communication protocols specific to data acquisition and processing, respecting the safety principles in operation. **C8.1** Specific concepts regarding methodologies, procedures and project elaboration, studies and team or individual reports for the purpose of design, virtual testing and implementation of electrical systems for vehicles. **C8.2** Creative use of knowledge for the performance and characteristics of vehicle-specific systems testing. **C8.3** Development of the conceptual and methodological set for increasing the individual work capacity in order to achieve specific tasks for the industry. **C8.4** The ability to evaluate complex problems and to communicate demonstratively the results of their own assessment.
Transversal competencies	CT1 Identifying the requirements, resources, processes, deadlines and risks necessary to prepare the execution plan and to carry out the professional and organizational tasks in compliance with the ethical norms agreed by the society. CT3 Self-control and planning of training needs, efficient use of information and communication resources, and assisted training (Internet portals, specialized software applications, databases, on-line courses, etc.) to meet the personal career development plan. CT4 Creative application of research techniques and solving specific problems related to the vehicles integrated electrical systems engineering.

7. Purposes of the discipline (according to the specific cumulated competences grid)

7.1 General purposes of the discipline	A good knowledge of the theoretical and applied techniques for the main components of an electric vehicle.
7.2 Specific purposes	The ability to understand and convey concepts and methods an electric vehicle.

8. Contents

8.1 Course	Teaching method	Observations
1. Introduction (2h) 1.1 The benefits of electro mobility. 1.2 Economy, cost of ownership.	Lecture, problematization, debate, heuristic dialogues	2 hours
2. Performance and consumption metrics of EV's (2h) 2.1 Range, consumption, performance. 2.2 Impact of EV parameters over safety.	Lecture, problematization, debate, heuristic dialogues	2 hours
3. EV security measures on the road (4h) 3.1 Charging levels and modes.	Lecture, problematization, debate, heuristic dialogues	4 hours

3.2 Maximizing battery life 3.3 Transportation of EV's and batteries		
4. Infrastructure for EV's (4h) 4.1. Utilizing smart grid and roaming. 4.2. Electric car charging capabilities.	Lecture, problematization, debate, heuristic dialogues	4 hours
5. EV and the climate. (2h)	Lecture, problematization, debate, heuristic dialogues	2 hours

Bibliography:

1. M. Boban, T. T. V. Vinhoza, Modeling and Simulation of Vehicular Networks: towards Realistic and Efficient Models, Source: Mobile Ad-Hoc Networks: Applications, Book edited by: Xin Wang, ISBN: 978-953-307-416-0, Publisher: InTech, Publishing date: January 2011
2. Fehr, W; (March 2011) The Vehicle-to-Vehicle (V2V) and Vehicle-to-Infrastructure (V2I) Technology Test Bed – Test Bed 2.0: Available for Device and Application Development, Available from http://www.its.dot.gov/factsheets/v2v_v2i_tstbd_factsheet.htm
3. Martin Eberhard and Marc Tarpenning, "The 21st Century Electric Car," Tesla Motors Inc, July 19, 2006
4. Romm,J. J. and Frank, A. A. "Hybrid Vehicles Gain Traction," Scientific American, v 294,n4, April 2006,p 763-770
5. M.Abdul-Hak, N.Al-Holou "ITS based Predictive Intelligent Battery Management System for plug-in Hybrid and Electric vehicles" Vehicle Power and Propulsion Conference, 2009. VPPC apos;09. IEEE Volume , Issue , 7-10 Sept. 2009 Page(s):138 – 144
6. Brinkman, N; Wang, M; Weber, T & Darlington,T (May 2005), Well-to-Wheels Analysis of Advanced Fuel/Vehicle Systems — A North American Study of Energy Use, Greenhouse Gas Emissions, and Criteria Pollutant Emissions, Available from http://greet.es.anl.gov/

8.2 Tutorial class/lab	Teaching methods	Observations
L01. Electric car charging capabilities — Comparison	Lecture, problematization, comparison	2 hours
L02. Real-Time simulation of a hybrid-electric vehicle	Lecture, problematization, development and execution of programs on PCs	2 hours
L03 & L04 & L05. Artificial Inteligence in control of electric vehicle (Fuzzy logic control of electric vehicle, Predictive Intelligent Battery Management System to Enhance the Performance of Electric Vehicle, Sugeno Inference Perturbation Analysis)	Lecture, problematization, development and execution of programs on PCs	6 hours
L06 & L07. Electric Vehicle Charging	Lecture, problematization, development and execution of programs on PCs	4 hours

Bibliography:

1. "Report: Impact of electric vehicle charging on electric grid operations could be more benign than feared," Pecan Street Research Institute, Tech. Rep., 10 2013. [Online]. Available: http://www.pecanstreet.org/2013/10/
2. B. McCracken, "The importance of real world data for utility risk management on electric vehicles," Pecan Street Research Institute, Tech. Rep., 09 2013. [Online]. Available: http://www.pecanstreet.org/
3. Pecan street database. [Online]. Available: http://www.pecanstreet.org/
4. Average retail price of electricity to ultimate customers by end-use sector. [Online]. Available: http://www.eia.gov/electricity/_monthly/epm_table_grapher.cfm?t=epmt_5_6_a

9. Corroboration of the discipline's contents with the expectations of epistemical community's representatives, professional associations and representative employers in the domain associated to the program

- SC Renault Romania – sucursala Titu
- SC Otelinox Targoviste;
- SC Arctic Gaesti;

10. Evaluations

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Weight in the final grade
10.4 Course	A good knowledge of the theoretical and applied techniques for the main components of an electric vehicle.	Exam	40%

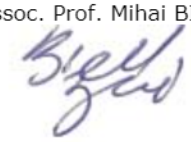
10.5 Tutorial class/lab	Check assimilating information from the laboratory	Evaluation	40%
	An effective use of resources and learning techniques	Permanent evaluation, tutorial classes	20%
10.6 Minimal standard of performance			
Acquirement of the competences and abilities previously mentioned at a minimum level of 5			

Signature of the course's professor
Assoc. Prof. Otilia DRAGOMIR

Signature of the tutorial class professor
Assoc. Prof. Otilia DRAGOMIR

Date of completion
1.09.2021

Signature of the Head of Department,
Assoc. Prof. Mihai BIZOI



Date of the approval in the department
27.09.2021

VALAHIA UNIVERSITY OF TARGOVISTE
Faculty of Electrical Engineering, Electronics And Informational Technology
AUTOMATION, INFORMATION AND ELECTRICAL ENGINEERING DEPARTMENT

SYLLABUS

1. Information about the program

1.1 Higher education institution	**Valahia University of Targoviste**
1.2 Faculty/Department	**Faculty of Electrical Engineering, Electronics and Informational Technology**
1.3 Department	**Automation, Information and Electrical Engineering Department**
1.4 Domain of study	**Electrical Engineering**
1.5 Cycle of study	**Master**
1.6 Studies program/Qualification	**Integrated Electrical Systems Engineering in Vehicles**

2. Information about the discipline

2.1 Name of the discipline				**Systems Engineering Management**			
2.2 Owner of the courses				**Assoc.Prof. Otilia DRAGOMIR**			
2.3 Owner of the tutorial classes				**Assoc.Prof. Otilia DRAGOMIR**			
2.4 Year of study	II	2.5 Semester	II	2.6 Type of evaluation	E	2.7 Status of the discipline	Compulsory

3. Estimated total time (hours of academic activities in a semester)

3.1 Number of hours in a week	3	of which: 3.2 course	2	3.3 tutorial class/lab	1L
3.4 Total of hours in the curricula	42	of which: 3.5 course	28	3.6 tutorial class/lab	14
Distribution of the effective time					hours
Study according to manual, course support, bibliography and notes					10
Additional documentation in the library, on specialized electronic platforms and in the field					15
Tutorial class preparation/labs, homework, papers, portfolios and essays					15
Tutor					15
Examinations					3
Other activities					
3.7 Total hours of individual study					**58**
3.9 Total hours in a semester					**100**
3.10 Number of credits					**4**

4. Preconditions (if case)

4.1 of curriculum	LET 1 B F 05 Computer Programming and Programming Languages LET 3 B D 01 Automatic regulation technic
4.2 of competences	Theoretical energy management, energy management processes, automatic regulation technic, computer programming and programming languages

5. Conditions (if case)

5.1 for course development Regular course classroom (25 places, video projector)
5.2 for tutorial class/project development Regular course classroom (25 places, 15 computers)

6. Specific cumulated competences

Professional competencies	**C5.1** Specific design concepts based on modelling and numerical simulation of the interactions and behaviour of components of vehicles integrated electrical systems. **C5.2** Developing solutions through the use of specialized knowledge for modelling, testing and numerical simulation of the components of electrical systems integrated into vehicles behaviour. **C5.3** The ability to accomplish numerical models for analysis, modelling, testing and simulation of the components behaviour of an electrical system. **C5.4** The ability to provide software solutions for analysing components of an electrical system, arguing with performance and quality levels. **C5.5** Capacity of design solutions validation using technical and economical optimized software models in the field of vehicles integrated electrical systems. **C5.6** Solving a problem of a Systems Engineering specific solution validation that tracks the behaviour of vehicles integrated electrical systems components using modelling and numerical simulation. **C6.1** Theoretical and applied concepts of Systems Engineering for the vehicle industry. **C6.2** Understanding and interpreting concepts, methods and behaviours specific to Systems Engineering within the profile industry. **C6.3** Using and implementing the principles of Systems Engineering in vehicles integrated electrical systems. **C6.4** Properly defining the objectives to be achieved in systems engineering specific project and the development of work plans. **C6.5** Identifying global Systems Engineering solutions within the vehicle industry **C6.6** Description based on mathematical models and specialized software analysis of industry-specific system engineering concepts. **C8.1** Specific concepts regarding methodologies, procedures and project elaboration, studies and team or individual reports for the purpose of design, virtual testing and implementation of electrical systems for vehicles. **C8.2** Creative use of knowledge for the performance and characteristics of vehicle-specific systems testing. **C8.3** Development of the conceptual and methodological set for increasing the individual work capacity in order to achieve specific tasks for the industry. **C8.4** The ability to evaluate complex problems and to communicate demonstratively the results of their own assessment. **C8.5** Ability to conduct individual or team projects in the field of vehicles integrated electrical systems. **C8.6** The ability to properly analyse and model electrical systems, design, testing and validate the solutions proposed for vehicles integrated electrical systems.
Transversal competencies	CT1 Identifying the requirements, resources, processes, deadlines and risks necessary to prepare the execution plan and to carry out the professional and organizational tasks in compliance with the ethical norms agreed by the society. CT2 Sharing roles and responsibilities in a team, performing leadership roles, coordinating the work, taking responsibility for the decisions, and establishing a communication strategy. CT3 Self-control and planning of training needs, efficient use of information and communication resources, and assisted training (Internet portals, specialized software applications, databases, on-line courses, etc.) to meet the personal career

	development plan. CT4 Creative application of research techniques and solving specific problems related to the vehicles integrated electrical systems engineering.

7. Purposes of the discipline (according to the specific cumulated competences grid)

7.1 General purposes of the discipline	The overall objective of the course is to deepen knowledge of the solutions for managing systems by acquiring Systems Engineering and Systems Engineering Management concepts.
7.2 Specific purposes	• To introduce students in Systems Engineering terminology. • To provide knowledge of systems components and relationships between them. • To introduce students to the tools and methodology associated with managing, testing and evaluation of systems. • To provide students with experience in identifying and analyse industry process management methods. • To provide students with know-how and practical approaches in testing and prototyping of electric systems components for vehicles.

8. Contents

8.1 Course	Teaching method	Observations
Systems Thinking and Engineering Management (systems, systems engineering and systems engineering management, principles and processes of systems engineering, system as a black box, factors and decisions, design solutions that meet customer needs)	Presentation of the concepts and interactive lecture.	4 hours
System Architecture and Design (fundamentals of system architectures and the architecting process, practical heuristics for developing good architectures, logical and physical elements that comprise the logical and physical architectures)	Presentation of the concepts and interactive lecture.	3 hours
Systems Integration (early validation, integration, test, verification, transition, and validation)	Presentation of the concepts and interactive lecture.	3 hours
Risk, Reliability and Resilience (risk, failure, robustness, reliability, resilience, quality and integrity)	Presentation of the concepts and interactive lecture.	3 hours
Complex Project Management (risk and estimation, understanding stakeholders, the political environment, managing the project team, project roles and partitioning)	Presentation of the concepts and interactive lecture.	4 hours
Tools for Systems Engineering - IBM Rational DOORS - part 1 (concepts and functionality, requirements and traceability, changes impact on requirements, design and test)	Presentation of the concepts and interactive lecture.	4 hours
Tools for Systems Engineering - IBM Rational DOORS - part 2 (IBM Rational DOORS database, relationships and attributes, managing change, management strategies)	Presentation of the concepts and interactive lecture.	4 hours
Technology Strategy (developing and acquiring new technologies, maturity of technology, measuring the maturity, ideas to new technology)	Presentation of the concepts and interactive lecture.	3 hours

Bibliography:

1. Benjamin S. Blanchard - System Engineering Management, 4th Edition, Wiley, 2008
2. Howard Eisner - Essential of Projects and Systems Engineering Management, Wiley, 2002
3. Dennis M. Buede, William D. Miller - The Engineering Design of Systems: Models and Methods (Wiley Series in Systems Engineering and Management) 3rd Edition, Wiley, 2016
4. IBM Academic Initiative – Rational DOORS

8.2 Tutorial class/lab	Teaching methods	Observations
Lab 1 – IBM Rational DOORS part 1 (Set up a sample project, Manage requirements collaboratively, intuitively, and at scale, Implement traceability across requirements, designs, and tests)	Concepts recap, debate, dialogues, problem solving, practical presentation	3 hours
Lab 2 – IBM Rational DOORS part 2 (Manage changes and analyze their impact on requirements, designs, tests, Integrate DOORS with other products and tools with OSLC, Collaborate with stakeholders using Rational DOORS Web Access)	Concepts recap, debate, dialogues, problem solving, practical presentation	3 hours
Lab 3 – IBM Rational DOORS part 3 (Navigate within a Rational DOORS database, Create structured data in a Rational DOORS formal module)	Concepts recap, debate, dialogues, problem solving, practical presentation	3 hours

Lab 4 – IBM Rational DOORS part 4 (Modify existing data in a Rational DOORS formal module, Review existing data in a Rational DOORS formal module)	Concepts recap, debate, dialogues, problem solving, practical presentation	3 hours
Lab 5 – IBM Rational DOORS part 5 (Create relationships in a Rational DOORS database, Report on relationships in a Rational DOORS database)	Concepts recap, debate, dialogues, problem solving, practical presentation	2 hours
S1 - Systems, Systems engineering and Systems Engineering Management	Concepts recap, debate, dialogues, problem solving	2 hours
S2 - System Architecture and Design	Concepts recap, debate, dialogues, problem solving	3 hours
S3 - Systems Integration	Concepts recap, debate, dialogues, problem solving	3 hours
S4 - Risk, Reliability and Resilience	Concepts recap, debate, dialogues, problem solving	2 hours
S5 - Risk estimation, Operating in a Global Environment, Project Roles and Partitioning	Concepts recap, debate, dialogues, problem solving	2 hours
S6 - How to turn ideas in new technology	Concepts recap, debate, dialogues, problem solving	2 hours

Bibliography:

1. Benjamin S. Blanchard - System Engineering Management, 4th Edition, Wiley, 2008
2. Howard Eisner - Essential of Projects and Systems Engineering Management, Wiley, 2002
3. Dennis M. Buede, William D. Miller - The Engineering Design of Systems: Models and Methods (Wiley Series in Systems Engineering and Management) 3rd Edition, Wiley, 2016
4. IBM Academic Initiative – Rational DOORS

9. Corroboration of the discipline's contents with the expectations of epistemically community's representatives, professional associations and representative employers in the domain associated to the program

The course develops competences which facilitate a better understanding of topics, concepts and theories relating to Systems Engineering and Systems Engineering Management, which play an essential part in the advanced instruction of the electrical engineer, automatization engineer, electronics engineer etc.

10. Evaluations

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Weight in the final grade
10.4 Course	Knowledge of aspects related to Systems Engineering and Systems Engineering Management	Exam	40%
10.5 Tutorial class/lab	Homework, tests	Evaluation essay/book review	30%
	Analysing and interpretation of data collected during lab experiments	The laboratory evaluations	30%
10.6 Minimal standard of performance			
Acquirement of the competences and abilities previously mentioned at a minimum level of 5			

Signature of the course's professor
Associate Prof. Otilia DRAGOMIR

Signature of the tutorial class professor
Associate Prof. Otilia DRAGOMIR

Date of completion
1.09.2021

Signature of the Head of Department,
Assoc. Prof. Mihai BIZOI

Date of the approval in the department
27.09.2021

VALAHIA UNIVERSITY OF TARGOVISTE
FACULTY OF ELECTRICAL ENGINEERING, ELECTRONICS AND INFORMATIONAL TECHNOLOGY
AUTOMATION, INFORMATION AND ELECTRICAL ENGINEERING DEPARTMENT

SYLLABUS

1. Information about the program

1.1 Higher education institution	**Valahia University of Targoviste**
1.2 Faculty/Department	**Faculty of Electrical Engineering, Electronics and Informational Technology**
1.3 Department	**Automation, Information and Electrical Engineering Department**
1.4 Domain of study	**Electrical Engineering**
1.5 Cycle of study	**Master**
1.6 Studies program/Qualification	**Integrated Electrical Systems Engineering in Vehicles**

2.Information about the discipline

2.1 Name of the discipline				**Practice for dissertation**			
2.2 Owner of the courses				-			
2.3 Owner of the tutorial classes				**Associate professor Ioan Corneliu Salisteanu**			
2.4 Year of study	II	2.5 Semester	II	2.6 Type of evaluation	C	2.7 Status of the discipline	Compulsory

3. Estimated total time (hours of academic activities in a semester)

3.1 Number of hours in a week	5hx12	of which: 3.2 course	0	3.3 tutorial class/lab	5
3.4 Total of hours in the curricula	60	of which: 3.5 course	0	3.6 tutorial class/lab	60

Distribution of the effective time	hours
Study according to manual, course support, bibliography and notes	230
Additional documentation in the library, on specialized electronic platforms and in the field	
Tutorial class preparation/labs, homeworks, papers, portfolios and essays	
Tutela	
Examinations	
Other activities	
3.7 Total hours of individual study	
3.9 Total hours in a semester	**250**
3.10 Number of credits	**10**

4. Preconditions (if case)

4.1 of curriculum	• Applied Research 1, 2, 3	
4.2 of competences	• Getting of minimal points at the subject Applied Research 1, 2, 3	

5. Conditions (if case)

5.1 for course development -
5.2 for tutorial class/lab development

6. Specific cumulated competences

Professional competencies	C1 Elaboration of studies, reports and documentation synthesis on the topic of electrical systems integrated in vehicles, knowing the principles and architecture of vehicles, knowing environmental impact, methods for cooling /heating electrical components in vehicles, knowing composite advanced materials used in specific electrical systems; C2 Solving specific research and design problems in the field of electrical systems integrated in vehicles by analyzing, modeling and simulation the control systems, control and automation systems, the components of the electric propulsion system, electromechanical and power electronics, the thermal regime of the subassemblies, proper use of dedicated software and dedicated hardware platforms; C3 Solving specific research and design problems in the field of electrical systems integrated in vehicles by knowing the capabilities of electric vehicles in terms of operational safety, development and management of object-oriented software applications, identifying the communication protocols of the transmission systems specific interfaces, data acquisition and processing, vehicles integration in smart grids; C4 Solving specific research and design problems in the field of electrical systems integrated in vehicles by knowing sensors and transducers in data acquisition and processing systems, modern measurement methods, data communication technologies, electric and electronic circuits design specific to vehicles; C5 Elaboration of research and development projects, technical assistance and consultancy on the specific concepts of systems engineering applied in the vehicle industry, proper use of modeling resources, testing and numerical simulation of the components behavior of electrical systems integrated in vehicles. C6 Developing the understanding capacity of concepts, methods and analysis techniques specific to electrical systems engineering applied in different vehicle architectures; C7 Knowledge of operating systems and support hardware platforms for intelligent control of the electrical systems integrated in vehicles specific processes; C8 Developing the individual and teamwork capabilities to carry out design-specific tasks, virtual testing and vehicle electrical systems design.
Transversal competencies	CT1 Identifying the requirements, resources, processes, deadlines and risks necessary to prepare the execution plan and to carry out the professional and organizational tasks in compliance with the ethical norms agreed by the society. CT2 Sharing roles and responsibilities in a team, performing leadership roles, coordinating the work, taking responsibility for the decisions, and establishing a communication strategy. CT3 Self-control and planning of training needs, efficient use of information and communication resources, and assisted training (Internet portals, specialized software applications, databases, on-line courses, etc.) to meet the personal career development plan. CT4 Creative application of research techniques and solving specific problems related to the vehicles integrated electrical systems engineering.

7. Purposes of the discipline (according to the specific cumulated competences grid)

7.1 General purposes of the discipline	• Subject objective consist of assimilation by the student of the specific tools of the scientific research and practice: documentation techniques, acquisition techniques, experimental processing and interpretation, principles of development of research reports, multimedia presentation techniques, etc.
7.2 Specific purposes	• Elaboration of studies, reports and synthesis of documentation, respectively technical-economic;

	• Solving specific design research problems in the field of integrated electrical systems engineering in vehicles • Achievement of experimental research with the use of modern equipment • Elaboration of the practical works being part of a team in the frame of complex projects

8.Contents

8.1 Course	Teaching method	Observations
8.2 Tutorial class/lab	Teaching methods	Observations
• Realization of the documentation on the dissertation theme		
• Performing experiments related to the dissertation theme		
• Writing of the disseration paper		
• Making a public presentation of the dissertation paper		
Bibliography:		

9.Corroboration of the discipline's contents with the expectations of epistemical community's representatives, professional associations and representative employers in the domain associated to the program

In order to draft the contents, to select the teaching/learning methods, the lecturer has organized meetings with members of Renault and other organizations, that are specialized in the field of Integrated Electrical Systems Engineering in Vehicles, and also in the field of technologies and equipment that are involved within the design and testing processes of automotive industry; meetings with representatives of public institutions (ministries, local authorities etc.); and meetings with other academic teachers in the field. The meeting has aimed the identification of the requirements and the expectations of employers in the field, and also to synchronize the syllabus with similar programs that are developed within other academic institutions.

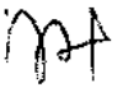
10. Evaluations

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Weight in the final grade
10.4 Course			
10.5 Tutorial class/lab	Activity during the semester	Written and oral evaluation	80%
	Final colloquy	Oral evaluation	20%
10.6 Minimal standard of performance			
Acquirement of the competences and abilities previously mentioned at a minimum level of 5			

Date of completion
1.09.2021

Signature of the course's professor

Signature of the tutorial class professor
Associate professor Ioan Corneliu Salisteanu



Date of the approval in the department
27.09.2021

Signature of the Head of Department,
Assoc. Prof. Mihai BIZOI