UNIVERSITY OF CRAIOVA
Faculty of Automation, Computers and Electronics
Department of Automatic Control and Electronics
Master degree program: EMBEDDED CONTROL SYSTEMS (SAI)

Curriculum 2018 – 2019

Year I		Year II	
Code	Study disciplines	**Code**	Study disciplines
D28SAIM101	Embedded systems architectures	D28SAIM301	Networked control systems
D28SAIM102	Advanced programming techniques	D28SAIM302	Embedded systems design using Matlab-Simulink
D28SAIM103	Embedded systems for process monitoring	D28SAIM303	Flight control systems
D28SAIM104	Software Testing	D28SAIM304	Critical information systems
D28SAIM105	Electronics and Interfaces for Embedded Systems	D28SAIM305	Software Project Management
D28SAIM106	Digital Control Algorithms	D28SAIM306a	Design and Development Practice 3
D28SAIM107a	Design and Development Practice 1	D28SAIM306b	Research Practice 3
D28SAIM107b	Research Practice 1		
D28SAIM201	Software structures for real time applications	D28SAIM401	Research Practice 4
D28SAIM202	Control systems in automotive	D28SAIM402	Dissertation Practice
D28SAIM203	Digital signal processors	D28SAIM403	Ethics and academic integrity
D28SAIM204	Actuation systems		
D28SAIM205	Communication systems and networks		
D28SAIM206a	Design and Development Practice 2		
D28SAIM206b	Research Practice 2		

DESCRIPTION

YEAR I

D28SAIM101	Embedded systems architectures

CREDIT POINTS (ECTS): 4
SEMESTER: I
DISCIPLINE TYPE: KNOWLEDGE
COURSE OBJECTIVES: Acquiring knowledge about:

- Architecture (hardware/software) and operation of typical embedded systems.
- Peripheral resources (I/O devices) architecture and operation for representative microcontrollers families
- Development environments used for application development (hardware, software, simulation, validation)

Development of abilities for selection and conditioning of a microcontroller (computing power, peripherals and other resources, software et.al.) as platform for an embedded system.
Home works and project used to illustrate the development of simple embedded systems applications with an 8 bit AVR microcontroller (Microchip) using an IDE with C programming language and co-simulation for validation.
CONTENT: Development environments: Integrated Development Environment (IDE), GCC Toolchains. (Re)Introduction to C programming for microcontrollers, coding standards. (Re)Introduction to computers architecture: Von Neumann, Harvard, RISC/CISC, microprocessors, microcontrollers, digital signal processors, memory systems, I/O devices management, Embedded systems architecture, hardware and software levels, microcontrollers, associated concepts: models, functions, benefits and constraints.
Other categories of embedded systems: PC controllers and COTS, ETX, COM, PC-104, SOC, etc..
Microcontrollers: introduction, applications, main characteristics, representative families.
Microchip 8 bit AVR family:

- Architecture, CPU, registers, instructions, program and data memories, fuses, clock generation system, reset generation system, I/O ports, timers and counters, analogue inputs, interrupt system, external interrupts.
- Serial communications, USART, USI, SPI, TWI (I2C)
- XMEGA sub-family
- IDEs and programming languages, starter kits and development systems, hardware and software for application programming.

Introduction to the ARM microprocessor / microcontroller family.
TEACHING LANGUAGE: Romanian
EVALUATION: Exam
BIBLIOGRAPHY:

1. Barrett, F.S, Pack, D. J. - Atmel AVR Microcontroller Primer: Programming and Interfacing, Second Edition, Synthesis Lectures on Digital Circuits and Systems, June 2012, Vol. 7, No. 2;
2. Barrett, F.S - Embedded Systems Design with the Atmel AVR Microcontroller: Part I, Synthesis Lectures on Digital Circuits and Systems, 2009;
3. Barrett, F.S- Embedded Systems Design with the Atmel AVR Microcontroller: Part II, Synthesis Lectures on Digital Circuits and Systems, 2009;
4. Dean A. G. - Embedded Systems Fundamentals with ARM Cortex-M based Microcontrollers: A Practical Approach, ARM Limited, 2017
5. Nicola, S., Microcontrolere. Aplicaţii in mecatronica, Ed. Universitaria , Craiova, 2005.

D28SAIM102	Advanced programming techniques

CREDIT POINTS (ECTS): 3
SEMESTER: I
DISCIPLINE TYPE: KNOWLEDGE
COURSE OBJECTIVES: The course presents advanced programming techniques useful to specialists in System Engineering. The main objectives of this course are:

- Study of advanced programming techniques
- Making use of technologies dependent on the problem to be solved;
- Developing the methodology of developing the applications specific to each technology.

The project has the role of fixing the theoretical knowledge.
CONTENT: Introduction to C # language. The principles of object-oriented programming. The structure of an object-oriented application in C #. Class Derivation (Inheritance). Polymorphism. Basic concepts of visual programming. Accessing and processing data through SQL Server.
TEACHING LANGUAGE: Romanian
EVALUATION: Exam
BIBLIOGRAPHY:

1. Herbert Schildt, C#: A Beginner's Guide, (2001);
2. Herbert Schildt, C#, Ed.Teora (traducere, 2002);
3. Karli Watson et al., Beginning Visual C#, Wrox Press Ltd. (2002);
4. Karli Watson, Beginning C# 2005 Databases, Wiley Publishing, Inc. (2006);
5. Bradley L. Jones, SAMS Teach Yourself the C# Language in 21 Days, (2004);
6. Philip Syme si Peter Aitken, SAMS Teach Yourself the C# Web Programming in 21 Days, (2002);
7. Kris Jamsa si Lars Klander, Totul despre C si C++ Manualul fundamental de programare in C si C++, Ed. Teora, (traducere 2007);
8. Şendrescu Dorin, Metode integrale pentru identificarea sistemelor continue, Editura

Universitaria, ISBN 978-606-510-669-4, (177 pag.), Septembrie 2009.
9. Dr. Kris Jamsa & Lars Klander, Totul despre C şi C++ - Manualul fundamental de programare în C și C++ , Ed. Teora, 2006.

D28SAIM103	Embedded systems for process monitoring

CREDIT POINTS (ECTS): 3
SEMESTER: I
DISCIPLINE TYPE: THOROUGHGOING STUDY
COURSE OBJECTIVES: The course and laboratory aim to acquire knowledge for

- identify areas of use of embedded systems,
- an appreciation of the technical characteristics imposed on embedded systems to meet specific requirements,
- choosing and testing embedded systems to optimize implementation of process monitoring applications.

CONTENT: Introduction. Specific modules of embedded structures for process monitoring. Application software for embedded systems used in process monitoring. Examples of process monitoring applications using embedded systems.
TEACHING LANGUAGE: Romanian
EVALUATION: Exam
BIBLIOGRAPHY:

1. Purcaru D., *Măsurări electronice*, Editura Universitaria, Craiova, 2004.
2. Purcaru D.M., *Senzori şi traductoare. Vol. I*, Editura Reprograph, Craiova, 2001.
3. Purcaru D., 2011, *Electronică. Note de curs,,* Editura Sitech, Craiova, ISBN: 978-606-11-1950-9 (162 pag.)
4. Rosch W., *Totul despre hardware. Ediţia a II-a*, Editura Teora, 2001.
5. Schildt H., *C Manual complet*, Editura Teora, 2000.
6. Toma L., *Sisteme de achiziţie şi prelucrarea numerică a semnalelor,* Editura de Vest, Timişoara, 1996.
7. Vârbănescu R., *Sisteme informatizate de măsurare*, Editura MATRIX ROM, Bucureşti,1999.
8. Melnic V., *Sisteme electronice de supraveghere* , Editura Teora, Bucureşti, 1999.

D28SAIM104	Software Testing

CREDIT POINTS (ECTS): 3
SEMESTER: I
DISCIPLINE TYPE: THOROUGHGOING STUDY
COURSE OBJECTIVES: The course aims at introducing the basic concepts of testing software applications:

- V test model: component testing, integration, system
- Generic types of testing (functional, non-functional, structure, regression)
- Static and dynamic testing (black-box or white-box)

CONTENT: V software development software and testing types: testing SW components, SW integration testing, system testing (HW + SW). Generic testing types. Static testing. Dynamic testing.
TEACHING LANGUAGE: Romanian
EVALUATION: Exam
BIBLIOGRAPHY:

1. A. Spillner, T. Linz, H. Shaefer: Software Testing Foundation. A Study Guide for the Certified Tester Exam, Rookynook 2006, Second edition (format pdf)
2. D. Graham, E. van Veenendaal, I. Evans, R. Black, Foundations of Software Testing: ISTQB certification, Thomson edition (format pdf)

D28SAIM105	Electronics and Interfaces for Embedded Systems

CREDIT POINTS (ECTS): 3
SEMESTER: I
DISCIPLINE TYPE: THOROUGHGOING STUDY
COURSE OBJECTIVES: :
1. Theoretical and experimental examination of typical input circuitry and of some basic actuators' interfaces specific to embedded systems;
2. Theoretical and experimental examination of software for analog and logical signals' aquisition and digital processing associated with embedded systems;
CONTENT: Sensors utilized in the aquisition of analog and numerical signals. Basics of states diagnosis and faults detection. Professional interface modules for electrical and non-electrical signals. Communication interfaces for embedded systems.
TEACHING LANGUAGE: Romanian
EVALUATION: Verification
BIBLIOGRAPHY:

1. Şerban, T. *Achiziţia datelor*, Editura Universitaria, Craiova, 2002
2. Nicolas Navet, N., Simonot-Lion, F, *Automotive Embeded Systems Handbook*, CRC Press, Taylor & Francis Group, ©2009, ISBN-13: 978-0-8493-8026-6
3. Infineon Technologies, *eLearnings* , http://www.infineon.com/cms/en/applications/automotive/elearning-center/,2015
4. Ribbens,W.B.,*Understanding Automotive Electronics, 6-th Edition*, Elsevier Science ©2003, ISBN 0-7506-7599-3
5. Fleming, W.J., *Overview of Automotive Sensors*, IEEE Sensors Journal, Vol.1, No.4, December 2001

D28SAIM106	Digital Control Algorithms

CREDIT POINTS (ECTS): 4
SEMESTER: I
DISCIPLINE TYPE: KNOWLEDGE
COURSE OBJECTIVES: Students will learn to:

- design digital control algorithms, starting from the requirements imposed on a microprocessor-based control system;
- use modeling and simulation methods for digital control systems;

- to implement the designed control algorithms in Matlab / Simulink or on numerical computing devices and evaluate their performances.

CONTENT: Discrete-time systems. Sampling process. *Z*-Transform. Discrete-time systems stability. Digital control systems. Digital control algorithms. Discretization of continuous systems. The finite length of the word and the structure of the compensator.
TEACHING LANGUAGE: Romanian
EVALUATION: Exam
BIBLIOGRAPHY:

1. Lurie B., Enright P., *Feedback Control: With MATLAB and Simulink*, CRC Press, 2011.
2. Leigh J. R., *Applied Digital Control: Theory, Design and Implementation.* Dover Publications, 2006.
3. Houpis C., Lamont G., *Digital Control Systems – Theory, Hardware, Software*, McGraw-Hill, New York, 1992.
4. Marin C., Popescu D., *Teoria sistemelor şi reglare automată*, Ed. Sitech, Craiova, 2007.
5. Marin C., *Sisteme discrete în timp*, Ed. Universitaria, Craiova, 2005.
6. Marin C., *Sisteme numerice cu durată finită a regimului tranzitoriu*, Ed. Sitech Craiova, 2005.
7. Marin C., *Analiza în domeniul timp a sistemelor discrete*, Ed. Sitech, Craiova, 2004.
8. Dumitrache I., *Ingineria reglării automate*, Politehnica Press, Bucureşti, 2005.
9. * * * *Matlab/Simulink Software*.

D28SAIM107a	Design and Development Practice 1

CREDIT POINTS (ECTS): 10
SEMESTER: I
DISCIPLINE TYPE: SYNTHESIS
COURSE OBJECTIVES: The students will learn to:

- Develop design and development activities
- Sketch a design plan
- Achieve an advanced individual documentation by using international indexed databases
- Achieve a preliminary study
- Use information applications for the achievement of complex projects for embedded systems
- Use modelling, simulation and design methods dedicated to control systems
- Implement and evaluate embedded control systems

CONTENT: as appropriate
TEACHING LANGUAGE: Romanian
EVALUATION: Verification
BIBLIOGRAPHY: as appropriate

D28SAIM107b	Research Practice 1

CREDIT POINTS (ECTS): 10
SEMESTER: I
DISCIPLINE TYPE: SYNTHESIS
COURSE OBJECTIVES: The students will learn to:

- Develop design and development activities
- Sketch a design plan
- Achieve an advanced individual documentation by using international indexed databases
- Achieve a preliminary study
- Use information applications for the achievement of complex projects for embedded systems
- Use modelling, simulation and design methods dedicated to control systems
- Implement and evaluate embedded control systems

CONTENT: as appropriate
TEACHING LANGUAGE: Romanian
EVALUATION: Verification
BIBLIOGRAPHY: as appropriate

D28SAIM201	Software structures for real time applications

CREDIT POINTS (ECTS): 4
SEMESTER: II
DISCIPLINE TYPE: SYNTHESIS
COURSE OBJECTIVES: The course presents the basic concepts regarding real-time management and control of processes in the following areas directions: methods and possibilities of development and implementation of a real-time executive, implementation of numerical algorithms for real time processes control, the applications architecture for processes control by using a real-time executive.
CONTENT: Real time computational systems. Basic concepts of real time programming. Primitives for real-time resources management. Implementation of numerical algorithms for processes control. Multitasking operating systems. Principles for achieving a streamlined multitasking executive intended for real time processes monitoring and control. An example of real-time kernel designed by using C++.
TEACHING LANGUAGE: Romanian
EVALUATION: Exam
BIBLIOGRAPHY:

1. Buhr R.J.A., Baileley D.L., An Introduction to Real-Time Systems, Prentice Hall, 1998.
2. Silberschatz A., G. Galvin, P. Gagne Operating System Concepts 7th Edition, Ed. Wiley, 2005.
3. Tanenbaum A., Modern Operating Systems, Ed. Pearson, 2009.
4. Mall R., Real-Time Systems: Theory and Practice, Pearson, 2007.
5. Liu J.W.S., Real-Time Systems, Integre Technical Publishing Co. Inc., Pearson, 2000.
6. Selişteanu, D., C. Ionete, E. Petre, Instrumentaţie virtuală. Aplicaţii de prelucrare numerică a semnalelor, Editura Matrix Rom, Bucureşti, 2010.
7. Lungu, V., Procesoare INTEL, Programare în limbaj de asamblare, Ediţia a II-a, Teora, 2007.
8. Tschirhart D., Commande en temps reel, Dunod, France, 1990.

9. Auslander D., Tham C., Real-time software for control: program Examples in C, Prentice Hall, 1990.
10. Holzner S., Borland C++ Programming, Brady Books, New York, 1992.
11. Marin C., Sisteme numerice cu durată finită a regimului tranzitoriu, Editura SITECH Craiova, 2005.
12. Marin, C., Sisteme discrete în timp, Editura Universitaria, Craiova, 2005.
13. Mazidi, M., Mazidi, J.- AVR Microcontroller and Embedded Systems: Using Assembly and C, Pearson Custom Electronics Technology, Prentice Hall, 2010.
14. ***, https://www.ni.com/manuals/ - LabView / Labwindows User Manual – National Instruments.
15. ***, https://www.microchip.com – microcontroloare (familia PIC12/16/18).
16. ***, https://www.nxp.com/pages/demonstration-board:DEMO9S08AW60E.

D28SAIM202 | Control systems in automotive

CREDIT POINTS (ECTS): 4
SEMESTER: II
DISCIPLINE TYPE: SYNTHESIS
COURSE OBJECTIVES: The course aims at introducing the basic concepts regarding the implementation of automotive control systems: general presentation of the main control systems, AUTOSAR as a design standard in the automotive industry, detailing AUTOSAR, Matlab / Simulink components for design and control of control systems, automatic code generation for electronic control units. The laboratory targets the consolidation of course concepts via modelling, simulation and practical applications.
CONTENT: Automotive control systems. Overview of automotive software architectures. Automotive Open System Architecture. Microcontroller Layer; role and functionality. ECU Abstraction Layer; role and functionality. Services Layer; role and functionality. RTE (Run Time Environment); application Layer. Implementation of control systems in automotive.
TEACHING LANGUAGE: Romanian
EVALUATION: Exam
BIBLIOGRAPHY:

1. Bonnick Allan W.M. – *Automotive computer controlled systems: diagnostic tools and techniques*, Elsevier Butterworth-Heinemann, 2001
2. Bonnick Allan W.M. – *Automotive Science and Mathematics*, Elsevier Butterworth-Heinemann, 2008
3. Denton, T. – *Automobile Electrical and Electronic Systems*, Elsevier Butterworth-Heinemann, 2004
4. Ionete C., Selişteanu D., *Echipamente de automatizare şi protecţie*, Reprografia Universităţii din Craiova, 2000.
5. Marin C., Petre E., Popescu D., Ionete C., Selişteanu D., *System Theory. Problems*, Sitech, Craiova, 2006.
6. AUTOSAR (AUTomotive Open System ARchitecture), http://autosar.org/.

D28SAIM203 | Digital signal processors

CREDIT POINTS (ECTS): 4
SEMESTER: II
DISCIPLINE TYPE: THOROUGHGOING STUDY
COURSE OBJECTIVES: The course presents the main problems and specific approaches to hardware processing of real-world signals. The approach is taken in the context of the implementation of control solutions in the field of embedded automation systems. Master students will learn to:

- to formulate requirements for a numerical signal processing system that embeds / encapsulates an automated control solution;
- to use designing, modeling and simulation methods for signal processing systems at both hardware and software levels;
- to evaluate the performance of real time architectures used in numerical signal processing.

The project has the role of fixing the theoretical knowledge and of highlighting the hardware problems of designing an embedded automated control application.
CONTENT: Introduction to numerical signal processors. System architectures with microprocessors. Embedded systems for numerical signal processing. The hardware architecture of the NXP® MC9S08AW60 family. Design of embedded applications with the NXP® MC9S08AW60 development system. Design of embedded applications with the NI cRIO-9024 system.
TEACHING LANGUAGE: Romanian
EVALUATION: Exam
BIBLIOGRAPHY:

1. *Oshana R., Kraeling M.,* "Software Engineering for Embedded Systems: Methods, Practical Techniques, and Applications", 2013, ISBN:978-0-12-415941-9; 978-0-12-415917-4;
2. Tanenbaum S. Andrew. "Modern Operating Systems", Ed. Pearson, 2009;
3. Lungu, V., "Procesoare INTEL, Programare in limbaj de asamblare", Ediţia a II-a, Teora, 2007;
4. ***, www.ni.com/lwcvi*/whatis/ (27.10.2018)*
5. ****,www.ni.com/ro-ro/shop/labview/labview-details.html (27.10.2018)*
6. ****, www.ni.com/ro-ro/shop/select/compactrio-controller ; (27.10.2018)*
7. ****, www.nxp.com/pages/demonstration-board:DEMO9S08AW60E ;(27.10.2018)*

D28SAIM204 | Actuation systems

CREDIT POINTS (ECTS): 4
SEMESTER: II
DISCIPLINE TYPE: THOROUGHGOING STUDY
COURSE OBJECTIVES: Students will learn to:

- formulate the requirements imposed on a actuation system for process control;
- use design, modeling and simulation methods for actuation systems;

- assess the performance of structures used in actuation systems.

The lab has the role of fixing the theoretical knowledge and of understanding phenomena through practical applications.

CONTENT: Structure and functions of embedded actuation systems, Control systems for direct current actuators, Automatic control systems for motor drives etc.

TEACHING LANGUAGE: Romanian

EVALUATION: Exam

BIBLIOGRAPHY:

1. A. Kelemen, M. Imecs, Sisteme de reglare cu orientare dupa cimp ale masinilor de c.a., Edit. Academiei, Bucuresti, 1989
2. R. Magureanu, Masini electrice speciale pentru sisteme automate, Edit. Tehnica Bucuresti, 1980.
3. A. Barzam, Automation in electrical power systemes, MIR Publishers, Moscow, 1981.
4. C. Volosenco, Sisteme de conducere a actionarilor electrice, Edit. Politehnica, Timisoara, 2007.
5. E. Bobasu, Conducerea proceselor electrice, notite de curs.
6. S. Ivanov, Reglarea vectoriala a sistemelor de actionare electrica, Tipografia Universitatii din Craiova, 2000.

D28SAIM205	Communication systems and networks

CREDIT POINTS (ECTS): 4

SEMESTER: II

DISCIPLINE TYPE: THOROUGHGOING STUDY

COURSE OBJECTIVES: Students will learn to:

- formulate the requirements imposed on a data transmission system in process control;
- use design, modeling and simulation methods for data transmission systems;
- evaluate the performance of structures used in data transmissions.

The laboratory and the project have the role to fix the theoretical knowledge and to understand the phenomena through practical applications.

CONTENT: Broadband transmission systems. Disturbance-resistant transmission systems. Transmissions into the baseband. Data compression techniques. Local networks for data transmission. Ethernet network. Wireless networks. Advanced communication systems.

TEACHING LANGUAGE: Romanian

EVALUATION: Exam

BIBLIOGRAPHY:

1. Dobrescu, R. - Transmiterea datelor, Ed. Academiei Române, 2005.
2. Feher K. - Comunicatii digitale avansate, vol. I-II, Ed. Tehnică Bucureşti 1993-1994.
3. Iancu, E. - Teoria transmisiei datelor, Ed. Universitaria Craiova, 2004.
4. Iancu, I., Moţa, M., Iancu, E. - Monitorizarea si diagnosticarea asistate de calculator la bolnavii cu diabet zaharat. Contributii la dezvoltarea sistemelor automate pentru controlul glicemiei, Ed. SITECH, 2010.
5. Odom W. - Primii paşi în reţele de calculatoare, Ed. Corint, Bucureşti, 2004.
6. Wilamowski, B., Irwin, J. D. - Industrial Communications Systems, CRC Press, 2011.

D28SAIM206a	Design and Development Practice 2

CREDIT POINTS (ECTS): 10

SEMESTER: II

DISCIPLINE TYPE: SYNTHESIS

COURSE OBJECTIVES: The students will learn to:

- Develop design and development activities
- Sketch a design plan
- Achieve an advanced individual documentation by using international indexed databases
- Achieve a preliminary study
- Use information applications for the achievement of complex projects for embedded systems
- Use modelling, simulation and design methods dedicated to control systems
- Implement and evaluate embedded control systems

CONTENT: as appropriate

TEACHING LANGUAGE: Romanian

EVALUATION: Verification

BIBLIOGRAPHY: as appropriate

D28SAIM206b	Research Practice 2

CREDIT POINTS (ECTS): 10

SEMESTER: II

DISCIPLINE TYPE: SYNTHESIS

COURSE OBJECTIVES: The students will learn to:

- Develop research activities
- Sketch a research plan
- Achieve an advanced individual documentation by using international indexed databases
- Achieve a preliminary study
- Use information applications for the achievement of complex projects for embedded systems
- Use modeling, simulation and design methods dedicated to control systems
- Implement and evaluate embedded control systems.

CONTENT: as appropriate

TEACHING LANGUAGE: Romanian

EVALUATION: Verification

BIBLIOGRAPHY: as appropriate

YEAR II

D28SAIM301	Networked control systems

CREDIT POINTS (ECTS): 3
SEMESTER: I
DISCIPLINE TYPE: SYNTHESIS
COURSE OBJECTIVES: The course aims at introducing basic concepts for the implementation of distributed control systems in the network: general presentation of industrial networks, delays introduced by control networks, simultaneous design of the task scheduler and the controller.
CONTENT: Paradigms and Methods of Designing Network Control Systems. Sharing of multitasking resources. Sharing communication resources. Industrial networks. Sharing of computing and communication resources. Control distributed over the network.
TEACHING LANGUAGE: Romanian
EVALUATION: Exam
BIBLIOGRAPHY:

1. Matlab/Simulink/RTW şi xPC documentation.
2. Quanser documentation
3. TrueTime documentation
4. CAN, LIN networks documentation
5. CANoe software (http://vector.com/vi_canoe_en.html).
6. Ionete C., Selişteanu D., Şendrescu D., Popescu D., Roman M., Surlea D., "Simulation of Real-Time Distributed Networked Control of Rotational Quanser Experiments using True Time and Matlab", Trans. on Automatic Control and Comp. Sci., Scientific Bulletin of The "Politehnica" University of Timişoara, Tome 53(67), pp. 87-94, 2008.
7. Technical report project SICOTIR, director Cosmin Ionete.

D28SAIM302	Embedded systems design using Matlab-Simulink

CREDIT POINTS (ECTS): 3
SEMESTER: I
DISCIPLINE TYPE: SYNTHESIS
COURSE OBJECTIVES: The course aims at introducing basic concepts regarding the implementation of embedded control systems using Matlab / Simulink: general presentation of Matlab / Simulink / Stateflow, Model-in-the-loop (MIL), Software-in-the-loop SIL), Hardware-in-the-loop (HIL) or Rapid prototyping.
CONTENT: Computing environment, modeling, simulation Matlab / Simulink / Stateflow. Computing environment, modeling, Matlab / Simulink / Stateflow simulation. Automatic Code Generators: TargetLink (dSpace) / RealTimeWorkshop (RTW) / EmbeddedCoder; MIL / SIL / PIL / HIL. Configuring code generators for specific microcontrollers.
TEACHING LANGUAGE: Romanian
EVALUATION: Exam
BIBLIOGRAPHY:

1. Matlab/Simulink/RTW documentation
2. TargetLink (dSpace) documentation
3. Quanser documentation
4. Ionete, C., E. Petre, M. Roman, D. Selişteanu, „Simulation of Real-Time Control System susing TrueTimeLibrary and Matlab", Int. Conf. On Technical Informatics CONTI'2008, Vol. 3, pp. 45-50, 2008, Timişoara, Romania.
5. Technical report project SICOTIR, director Cosmin Ionete.

D28SAIM303	Flight control systems

CREDIT POINTS (ECTS): 5
SEMESTER: I
DISCIPLINE TYPE: SYNTHESIS
COURSE OBJECTIVES: Students will learn to:

- use specific flight control methods
- formulate an automated control problem with an aviation application
- use design, modeling and simulation methods for continuous and discrete automated systems with aviation applications
- evaluate the performance of automated structures

The laboratory has the role of fixing the theoretical knowledge and of understanding phenomena through practical applications.
CONTENT: Elements of flight dynamics. Flight with ceded commands. Helicopter. System structures for automatic control. The automatic pilot.
TEACHING LANGUAGE: Romanian
EVALUATION: Exam
BIBLIOGRAPHY:

1. Aron I., Lungu R. – Automate de stabilizare şi dirijare, Ed. Militară, Bucureşti, 1991
2. Costăchescu, T. – Tehnica zborului în aviaţie, Ed. Tehnică, Bucureşti, 1979
3. Costăchescu, T. – Defecte şi accidente în aviaţie. Măsuri de prevenire, Ed. Tehnică, Bucureşti, 1993
4. Etkin, B. – Dynamics of Atmospheric Flight, John Wiley & Sons, N.Y., 1972
5. Said D. Jenie, Agus Budiyono - Automatic Flight Control System. Classical approach and modern control perspective, Department of Aeronautics and Astronautics, ITB, 2006
6. Iancu, E., Vînătoru, M. – Detecţia şi localizarea defectelor în sistemele dinamice, Ed. Sitech, Craiova, 1999.

D28SAIM304	Critical information systems

CREDIT POINTS (ECTS): 3
SEMESTER: I
DISCIPLINE TYPE: SYNTHESIS

COURSE OBJECTIVES: The course presents an introduction to the critical information systems and the standards used for software development, with Exam ples in aerospace.
CONTENT: An introduction to critical information systems. The software development process. ESA Standards for software development. The MIL-STD-498 software development standard. Standards for safety critical systems: DO-178B and ARP 4754.
TEACHING LANGUAGE: Romanian
EVALUATION: Exam
BIBLIOGRAPHY:

1. Critical Information Systems Engineering: note de curs; Lucian-Florentin Barbulescu, octombrie 2017;
2. ESA software engineering standards, European Space Agency / Agence Spatiale Européenne, 2008
3. Software Development and Documentation Standard, MIL-STD-498, US Department of Defence, Washington DC, December, 1994.
4. DO-178B/ED-12B, Software Considerations in Airborne Systems and Equipment Certification, RTCA/EUROCAE
5. Software Engineering (8h Edition); Ian Sommerville; Addison Wesley; 2004 (biblioteca universitatii).

D28SAIM305	Software Project Management

CREDIT NUMBER: 5
SEMESTER: I
DISCIPLINE TYPE: SYNTHESIS
COURSE OBJECTIVES: Presentation of concepts regarding time, domain and cost management, quality management, Human Resources management and Risk Management.
CONTENTS: Introduction to project management, Software development methods, Domain Management, Financial justification of the project. Time Management. Cost estimation of a software project. Quality Management. Human resources management. Leadership. Communication and risk management. Decisions analysis.
TEACHING LANGUAGE: romanian
EVALUATION: Exam
BIBLIOGRAPHY:

1. Beck, K. (1998). Extreme Programming: A Humanistic Discipline of Software Development, FASE 1998: 1-6
2. Berkun, S. (2005). The Art of Project Management, O'Reilly.
3. Duncan, W. R. (1996). A Guide to the Project Management Body of Knowledge, Project Management Institute, PMI Publishing Division.
4. Gustafson, D. H., Cats-Baril, W. L., Alemi, F. (1992). Introduction to Decision Analysis, in Systems to Support
5. Health Policy Analysis: Theory, Model and Uses, Health Administration Press: Ann Arbor, Michigan.
6. LeRoi Burback, R. (1999). Software Engineering Methodology: The WaterSluice, PhD Thesis, Stanford University, http://www-db.stanford.edu/~burback/watersluice.

D28SAIM306a	Design and Development Practice 3

CREDIT POINTS (ECTS): 10
SEMESTER: I
DISCIPLINE TYPE: SYNTHESIS
COURSE OBJECTIVES: The students will learn to:

- Develop design and development activities
- Sketch a design plan
- Achieve an advanced individual documentation by using international indexed databases
- Achieve a preliminary study
- Use information applications for the achievement of complex projects for embedded systems
- Use modelling, simulation and design methods dedicated to control systems
- Implement and evaluate embedded control systems

CONTENT: as appropriate
TEACHING LANGUAGE: Romanian
EVALUATION: Verification
BIBLIOGRAPHY: as appropriate

D28SAIM306b	Research Practice 3

CREDIT POINTS (ECTS): 10
SEMESTER: I
DISCIPLINE TYPE: SYNTHESIS
COURSE OBJECTIVES: The students will learn to:

- Develop research activities
- Sketch a research plan
- Achieve an advanced individual documentation by using international indexed databases
- Achieve a preliminary study
- Use information applications for the achievement of complex projects for embedded systems
- Use modelling, simulation and design methods dedicated to control systems
- Implement and evaluate embedded control systems

CONTENT: as appropriate
TEACHING LANGUAGE: Romanian
EVALUATION: Verification
BIBLIOGRAPHY: as appropriate

D28SAIM401	Research Practice 4

CREDIT POINTS (ECTS): 15
SEMESTER: II
DISCIPLINE TYPE: SYNTHESIS
COURSE OBJECTIVES: Students will learn to:

- Develop research activities
- Sketch a research plan

- Achieve an advanced individual documentation by using international indexed databases
- Achieve a preliminary study
- Use information applications for the achievement of complex projects for embedded systems
- Use modelling, simulation and design methods dedicated to control systems.

CONTENT: as appropriate
TEACHING LANGUAGE: Romanian
EVALUATION: Verification
BIBLIOGRAPHY: as appropriate

D28SAIM402	Dissertation Practice

CREDIT POINTS (ECTS): 14
SEMESTER: II
DISCIPLINE TYPE: SINTEZĂ
COURSE OBJECTIVES: Students will learn to:

- Carries out research, design and writing of a professional / scientific work in the field of System Engineering.
- Perform advanced individual documentation using an internationally indexed database
- Perform a preliminary study
- Use computer technologies for the practical application of the dissertation thesis.
- Use design, modeling and simulation methods for complex systems.
- Carry out the documentation of the dissertation paper.

CONTENT: as appropriate
TEACHING LANGUAGE: Romanian
EVALUATION: Verification
BIBLIOGRAPHY: as appropriate

D28SAIM403	Ethics and academic integrity

CREDIT POINTS (ECTS): 2
SEMESTER: II
DISCIPLINE TYPE: SYNTHESIS
COURSE OBJECTIVES: :

- Initiating the students in the field of ethics and academic integrity
- Quantitative and qualitative analysis of the elements specific to ethics and academic integrity
- The integration of the knowledge acquired from other disciplines in the training process of the students in the development of their reports and case studies.

CONTENT: Defining academics deviations – sanctions. Problems of ethics in the academic research. The issues of academic plagiarism. Ethics in teaching in the academic environment. University policies that affect the academic environment.
TEACHING LANGUAGE: Romanian
EVALUATION: Verification
BIBLIOGRAPHY:

1. Bertram Gallant T., Academic Integrity in the 21st Century: A Teaching and Learning Imperative, Jossey-Bass, 2008.
2. Burlea Şchiopoiu A. (coordonator), *De la Responsabilitatea Socială a Întreprinderii la Responsabilitatea Socială Deschisă*, Editura SITECH, 2009.
3. Macfarlane, B., Zhang J., Pun A., Academic integrity: a review of the literature, Studies in Higher Education, 39:2, 339-358, DOI: 10.1080/03075079.2012.709495. 2012.
4. Macfarlane B., Researching with integrity: the ethics of academic enquiry, Routledge, 2009.
5. Stachowicz-Stanusch A., Academic ethos management: building the foundation for integrity in management education. Business Expert Press, 2012.
6. Sutherland-Smith W., Plagiarism, the Internet, and Student Learning: Improving Academic Integrity, Routledge, 2008.Milton C.L. Ethics and Academic Integrity. Nursing Science Quarterly. Vol. 28 (1), pp. 18-20. doi: 10.1177/0894318414558620. 2014.
7. American Association of University Professors. Policy documents and reports. Washington, DC: American Association of University Professors. (1994).
8. Baca, M. C. & Stein, R. H. (Eds.). Ethical principles, practices and problems in higher education. Springfield, IL: Charles C. Thomas, Publisher. (1983).
9. Burlea Şchiopoiu A., 2012, *The Ethical Issue in Internet Communication*, in *Internet Communication Management. International Week*, edited by M. Pankowska and W. Dyduch, published by University Publisher Office Poland.
10. Burlea Şchiopoiu A., 2013, *An Aristotelian approach to sustainable management*, in *Encyclopedia of Corporate Social Responsibility* – PART - *Sustainability/Sustainable Development*, ed. Samuel Idowu.