Istarsko veleučilište
Università Istriana
di scienze applicate

Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Computers Application Basics**	
Course status	Mandatory	
Year	1.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	3
	Number of hours in the semester (L+E+S)	15+30+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

Introduce students to computer technologies and their applications.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Identify, specify, and analyse an information system and its subsystems.
2. Classify software support according to type and purpose.
3. Manage the information system, student services, and email account.
4. Identify the type and configuration of the network, as well as risks related to the misuse of information technology and remote data transmission.
5. Prepare a workstation considering computer, software, and working environment requirements.
6. Utilize software tools for text editing, spreadsheet processing, simple database creation, and multimedia presentations.

1.4. Course content

1. Introduction to information systems: purpose, function, and structure.
2. Components of an information system:
    a) Hardware
    b) Software
    c) Netware
    d) Dataware
    e) Lifeware
    f) Orgware
3. Text processing
4. Spreadsheets
5. Simple databases
6. Multimedia presentations
7. Web technologies
8. Communication and collaboration

1.5. Teaching methods	☒ lectures	☒ individual exercises

	☐ seminars and workshops ☒ exercises ☒ distance learning	☐ multimedia and network ☒ laboratory ☐ mentoring work ☐ other _____

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Written verification 1	Written verification 2	Min	Max
LO1	4%	6%	-	5%	10%
LO2	4%	6%	-	5%	10%
LO3	4%	6%	-	5%	10%
LO4	4%	6%	-	5%	10%
LO5	4%	6%	-	5%	10%
LO6	20%	-	30%	25%	50%
Share in ECTS	1.2	0.9	0.9		3
Total	40%	30%	30%	50%	100%

Final Exam:

Learning outcome	Written Exam	Oral Exam	Min	Max
LO1	6%	8%	7%	14%
LO2	6%	8%	7%	14%
LO3	6%	8%	7%	14%
LO4	6%	8%	7%	14%
LO5	6%	8%	7%	14%
LO6	30%	-	15%	30%
Share in ECTS	1.8	1.2	-	3
Total	60%	40%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
The results that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F

	50,00-59,99	sufficient (2)	D, E	
	60,00-74,99	good (3)	C	
	75,00-89,99	very good (4)	B	
	90,00-100,00	excellent (5)	A	

1.8. Obligatory literature

1. Leadbetter, C., Blackford, R., & Piper, T. (2012). Cambridge international AS and A level computing coursebook. Cambridge, England: Cambridge University Press.

1.9. Additional literature

1. Jordan, C. (2022). Advanced word processing with Microsoft word (2nd ed.). Conor.
2. Jordan, C. (2022). Management Spreadsheets (2nd ed.). Conor.
3. Jordan, C. (2022). Advanced database (2nd ed.). Conor.
4. Jordan, C. (2022). Advanced presentation (2nd ed.). Conor.

1.10. Quality monitoring method

Teaching evaluations; student survey.

Istarsko veleučilište
Università Istriana
di scienze applicate

Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Mathematics**	
Course status	Mandatory	
Year	1.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	7
	Number of hours in the semester (L+E+S)	45+45+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

Acquiring of the outcomes provided by the curriculum, which serves to acquire knowledge and skills to work independently and also as a good preparation to successfully continue study program.
Analysing a realistic problem and creating an appropriate mathematical model and a critical review of the obtained results.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Solve the expression's value with basic arithmetic operations in which complex numbers appear.
2. Explain the value of the determinant and simple expressions with matrices.
3. Explain the meaning of vector multiplication in practice.
4. Solve the system of linear equations.
5. Expand the meaning of the definition of a function, Function composition and Inverse function.
6. Sketch graphs of polynomials, trigonometric function and rational functions without the help of derivatives.
7. Examine the existence of limes of a function and solve the derivative of the function.
8. Sketch the graph of a function with the help of derivatives and critical points.

1.4. Course content

1. Complex numbers, algebraic and trigonometric notation a complex number, basic arithmetic operations with complex numbers (addition, subtraction, multiplication, division, exponentiation with whole number, inverse exponentiation, Complex plane)
2. Determinant (2nd order - formula, 3rd order Sarrus rule and Laplace expansion, 4th order Laplace expansion and elementary transformations)
3. System of linear equations, Solving using Cramer's rule and Gauss-Jordan elimination method
4. Vectors: Operations with vectors, coordinate system and canonical basis, scalar multiplication of vectors, vector multiplication of vectors, mixed product of vectors
5. Functions, definition, domain, codomain, definition area, image of a function, injection, surjection, bijection, graph of a function, increasing and decreasing of a function, monotonicity, composition of functions, inverse function, even and odd functions, zero of a function.
6. Elementary functions: power, polynomials, exponential functions, logarithmic functions, trigonometric functions, hyperbolic functions
7. Limes, sequences

8. Sketching graphs of some functions (polynomials, trigonometric functions)
9. Problem of finding a tangent, derivative of a function, Rules for the sum derivative, product and quotient of two functions
10. Differential, implicit derivative, parametric derivative
11. Derivative of a composite function, derivative of the function f(x)=x^x. LHopital's rule
12. Taylor polynomial function at zero

1.5. Teaching methods	☒ lectures ☒ seminars and workshops ☒ exercises ☒ distance learning	☒ individual exercises ☐ multimedia and network ☐ laboratory ☐ mentoring work ☐ other _____

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Forms of achievement evaluation are possible:

- Continuous checking during classes
- Completed homework
- Written verification

Continuous checking:

Learning outcome	Class activity	Written verification 1	Written verification 2	Written verification 3	Seminar/ presentation	Min	Max
LO1	2%	8%	-	-	-	5%	10%
LO2	2%	8%	-	-	-	5%	10%
LO3	2%	8%	-	-	-	5%	10%
LO4	2%	-	12%	-	-	7%	14%
LO5	2%	-	12%	-	-	7%	14%
LO6	2%	-	-	12%	-	7%	14%
LO7	2%	-	-	12%	-	7%	14%
LO8	2%	-	-	-	12%	7%	14%
Share in ECTS	1.12	1.68	1.68	1.68	1.68	-	7
Total	16%	24%	24%	24%	12%	50%	100%

Final Exam:

Learning outcome	Written Exam	Oral Exam	Min	Max
LO1	16%	-	8%	16%
LO2	-	12%	6%	12%
LO3	16%	-	8%	16%
LO4	16%	-	8%	16%
LO5	-	12%	6%	12%
LO6	-	12%	6%	12%
LO7	16%	--	8%	16%
Share in ECTS	4.48	2.52	-	7

Total	64%	36%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
The results that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E
60,00-74,99	good (3)	C
75,00-89,99	very good (4)	B
90,00-100,00	excellent (5)	A

1.8. Obligatory literature

1. P. Javor. Uvod u matematičku analizu, Školska knjiga, Zagreb, 1983.
2. B. P. Deminovič. Zadaci i rješeni primjeri iz više matematike, Danjar, Zagreb, 1995.
3. N. Elezović. Linearna algebra, Element, Zagreb, 1995.

1.9. Additional literature

1. Raymond A. Barnett, Michael R. Ziegel, Karl E. Byleen : Primijenjena matematika
2. L. Krnić, Z. Šikić. Račun diferencijalni i integralni, I dio, Školska knjiga, Zagreb, 1992.
3. V. Devide. Riješeni zadaci iz više matematike, svezak i i II, Školska knjiga, Zagreb, 1985.
4. T. Bradić, R. Roki, J. Pečarić, M. Strunje. Matematika za tehničke fakultete, Multigraf, Zagreb, 1994.

1.10. Quality monitoring method

Teaching evaluations; student survey.

Istarsko veleučilište
Università Istriana
di scienze applicate

Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Mechanics and Strength of Materials**	
Course status	Mandatory	
Year	1.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	6
	Number of hours in the semester (L+E+S)	30+45+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

After attending and passing the course, students are trained to apply knowledge and skills that enable understanding of concepts, fundamental laws, and principles related to solving engineering problems in the field of engineering mechanics (statics) and strength of materials. Successful mastery of the material in this subject creates a good foundation for understanding the courses Mechatronic Machine Elements, Computer Aided Design, Essentials of Mechanisms and Dynamic System Modelling.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Set the equilibrium conditions of a planar concurrent and parallel system of forces and determine the reactions of the connections.
2. Determine, analytically, grapho-analytically, and graphically, the resultant of an arbitrary system of forces in the plane and set the equilibrium conditions.
3. Determine the forces and reactions of connections in a spatial concurrent system of forces.
4. Calculate the centroids and moments of inertia of simple and complex surfaces and bodies.
5. Calculate and analyze stresses and strains as a result of basic mechanical loads.
6. Analyze and check the dimensions of beam structures.
7. Calculate and analyze individual types of differently loaded supports from the point of view of mechanical work and strain energy.

1.4. Course content

1. Force, moment. Newton's laws and axioms of statics. Connections and their reactions.
2. Analytical and graphical equilibrium conditions of forces in the system. The equilibrium of the system of forces in the plane and space.
3. The free-body diagram. Statically determinate and statically indeterminate structures.
4. Moment of a force about a point. Sliding friction. Application of friction in machines. Rolling friction.
5. Spatial system of forces.
6. Centroids of simple and complex bodies. Determination of moments of inertia of plane sections.
7. Stress and strain: basic theories of internal forces and deformation. Axial and shear loads. Longitudinal and transverse strains. Generalized Hooke's law.
8. Torsional load. Shear stresses. Normal stresses. Calculation of torque and power transmission shafts.
9. Pure bending: deflections, strains, stress. Unsymmetrical bending. General case of eccentric loading.

10. Plane stress transformation. Mohr's stress circle.
11. Deflections and elastic lines of beam structures.
12. Mechanical work and strain energy for different load cases in trusses and beam structures.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☒ distance learning	☒ individual exercises ☐ multimedia and network ☒ laboratory ☐ mentoring work ☐ other _____

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Written verification 1	Written verification 2	Independent work tasks	Seminar / presentation	Min	Max
LO1	1%	7%	-	2%	-	5%	10%
LO2	1%	7%	-	2%	-	5%	10%
LO3	1%	8%	-	2%	-	5,5%	11%
LO4	1%	8%	-	2%	4%	7,5%	15%
LO5	1%	-	8%	2%	7%	9%	18%
LO6	-	-	9%	3%	7%	9,5%	19%
LO7	-	-	8%	2%	7%	8,5%	17%
Share in ECTS	0.3	1.8	1.5	0.9	1.5	-	6
Total	5%	30%	25%	15%	25%	50%	100%

Final Exam:

Learning outcome	Independent work tasks	Seminar / presentation	Oral Exam	Min	Max
LO1	2%	-	8%	5%	10%
LO2	2%	-	8%	5%	10%
LO3	2%	-	8%	5%	10%
LO4	2%	4%	8%	7%	14%
LO5	2%	7%	9%	9%	18%
LO6	3%	7%	10%	10%	20%
LO7	2%	7%	9%	9%	18%
Share in ECTS	0.9	1.5	3.6	-	6
Total	15%	25%	60%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.

The results that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E
60,00-74,99	good (3)	C
75,00-89,99	very good (4)	B
90,00-100,00	excellent (5)	A

1.8. Obligatory literature

1. Materials from e-learning.
2. Beer, F.P, Johnston E.R., DeWolf, J.T., Mazurek, D.F. (2017). Statics and Mechanics of Materials. New York: McGraw Hill

1.9. Additional literature

1. Brnić, J. (2004). Statika. Rijeka: Sveučilište u Rijeci, Tehnički fakultet
2. Alfirević, I. (1989). Nauka o čvrstoći. Zagreb: Tehnička knjiga

1.10. Quality monitoring method

Teaching evaluations; student survey.

Istarsko veleučilište
Università Istriana
di scienze applicate

Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Programming Basics**	
Course status	Mandatory	
Year	1.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	5
	Number of hours in the semester (L+E+S)	15+45+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

The aim of this course is to introduce students to the fundamental concepts of programming, develop their programming competencies and algorithmic thinking, and enable them to independently program in the C programming language.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Apply fundamental concepts in developing a software solution for a given problem.
2. Analyse the basic elements of a C program.
3. Formulate a programming problem unambiguously and clearly according to the rules for defining common problems.
4. Manage basic tools for program development.
5. Select appropriate data types for a given problem and suitable aggregation mechanisms for efficient storage of input data, and implement the chosen data organization in the specified imperative programming language.
6. Develop, adapt, and optimize an algorithmic solution specified by pseudocode or an activity diagram to the specifics of programming constructs (selection, iteration, etc.) of the given imperative programming language.
7. Test the given program code for errors.

1.4. Course content

1. From problem to program in the C programming language.
2. Basics of the C programming language (introduction).
3. Software support (system and application).
4. Basic data types, operators, and expressions.
5. Program flow control.
6. Functions.
7. Arrays.
8. Pointers.
9. Complex data types.
10. Standard libraries.
11. Input and output.

12. Algorithms.
13. Debugging and error handling.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☒ distance learning	☒ individual exercises ☐ multimedia and network ☒ laboratory ☐ mentoring work ☐ other _____

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Written verification 1	Written verification 2	Min	Max
LO1	4%	9%	-	6%	13%
LO2	4%	9%	-	6%	13%
LO3	4%	9%	-	7%	13%
LO4	4%	9%	-	7%	13%
LO5	5%	-	11%	8%	16%
LO6	6%	-	11%	9%	17%
LO7	5%	-	10%	7%	15%
Share in ECTS	1.6	1.8	1.6	-	5
Total	32%	36%	32%	50%	100%

Final Exam:

Learning outcome	Written Exam	Oral Exam	Min	Max
LO1	11%	-	5%	11%
LO2	11%	5%	8%	16%
LO3	11%	5%	8%	16%
LO4	11%	5%	8%	16%
LO5	12%	5%	8%	17%
LO6	12%	-	7%	12%
LO7	12%	-	6%	12%
Share in ECTS	4	1	-	5
Total	80%	20%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
The results that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until

the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E
60,00-74,99	good (3)	C
75,00-89,99	very good (4)	B
90,00-100,00	excellent (5)	A

1.8. Obligatory literature

1. Kernighan, B. W., & Ritchie, D. M. (1988). C Programming Language (2nd ed.). Philadelphia, PA: Prentice Hall.
2. King, K. N. (2008). C Programming (2nd ed.). New York, NY: WW Norton.

1.9. Additional literature

1. Gustedt, J. (2019). Modern C. New York, NY: Manning Publications.
2. Hanly, J. R., Koffman, E. B., & Tahiliani, M. P. (2015). Problem Solving and Program Design in C, global edition.

1.10. Quality monitoring method

Teaching evaluations; student survey.

Istarsko veleučilište Università Istriana di scienze applicate		
Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Sensors**	
Course status	Mandatory	
Year	1.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	5
	Number of hours in the semester (L+E+S)	30+30+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

After listening to and passing the course, students are trained to apply knowledge and skills that enable the correct selection and application of sensors in solving engineering tasks in the field of mechatronics.

The course enables the understanding of the material from the course "Manipulators and robots" and other courses in the undergraduate professional study of mechatronics that include the application of sensor elements

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Review the principles of physics, electrical engineering and electronics with the modes of operation and construction of sensors for monitoring mechanical and process quantities in automated systems.
2. Determine the difference in properties of analogic, binary and digital sensors and their applications.
3. Evaluate the static and dynamic characteristics of analogic sensors.
4. Justify the choice of a suitable sensor for measuring and monitoring certain quantities in a given system.
5. Determine the causes of improper sensor operation.
6. Valorize the operational parameters of the sensor.
7. Adjust the method of solving the task in accordance with the available resources.

1.4. Course content

General terms related to measurement and sensors, basic characteristics of sensors (static characteristics, sensitivity, linearization). Properties of sensor systems. Deviations, deformations and measurement techniques with the field of optical sensors (camera system).
Sensors based on electrical resistance, variable resistors, voltage divider, resistance bridge.
Displacement and position sensors, optical distance measurement. Temperature sensors.
Sensors based on the magnetic field, principles of operation. Pressure and stress. Ultrasound and ultrasonic distance sensor. Computer data acquisition, basic concepts and working methods, sensor systems.
Optical and fibre optic sensors, smart structures.

1.5. Teaching methods	☒ lectures	☒ individual exercises

	☐ seminars and workshops ☒ exercises ☐ distance learning	☐ multimedia and network ☒ laboratory ☐ mentoring work ☐ other _____

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Written verification 1	Written verification 2	Laboratory exercises	Exercises	Min	Max
LO1	5%	-	-	3%	5%	6,5%	13%
LO2	-	10%	-	-	-	5%	10%
LO3	-	10%	-	4%	-	7%	14%
LO4	5%	-	10%	3%	-	9%	18%
LO5	-	10%	-	2%	-	6%	12%
LO6	-	-	10%	4%	-	7%	14%
LO7	-	-	10%	4%	5%	9,5%	19%
Share in ECTS	0.5	1.5	1.5	1	0.5	-	5
Total	10%	30%	30%	20%	10%	50%	100%

Final Exam:

Learning outcome	Written Exam	Min	Max
LO1	20%	10%	20%
LO2	20%	10%	20%
LO3	20%	10%	20%
LO4	14%	7%	15%
LO5	6%	3%	5%
LO6	12%	6%	12%
LO7	8%	4%	8%
Share in ECTS	5	-	5
Total	100%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
The results that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E
60,00-74,99	good (3)	C
75,00-89,99	very good (4)	B
90,00-100,00	excellent (5)	A

1.8. Obligatory literature

1. Grbac Babić S.: Presentations from lectures and exercises and other teaching materials - available online through the Merlin e-learning system
2. Juraj Božičević: Temelji automatike, Školska knjiga, Zagreb 2008. – selected chapters

1.9. Additional literature

1. Jon S. Wilson: Sensor Technology Handbook, Nevnes/Elsevier, 2004. - selected chapters
2. Jacob Fraden: Handbook of Modern Sensors, Springer, 2010. – selected chapters
3. John G. Webster: Measurement, Instrumentation, and Sensors Handbook, CRC Press LLC, 1999. - selected chapters
4. Manufacturer's catalogues materials and Data Sheets.

1.10. Quality monitoring method

Teaching evaluations; student survey.

Istarsko veleučilište
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Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Technical Documentation**	
Course status	Mandatory	
Year	1.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	4
	Number of hours in the semester (L+E+S)	15+45+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

The aim of the course is to acquire knowledge necessary for designing, creating, reading, understanding technical documentation and abilities for engineering communication by drawing. Developing a sense of the connection between two-dimensional and three-dimensional display, the adoption of norms characteristic for the creation of technical documentation by computer the AutoCAD program.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Create a technical drawing respecting the norms
2. Familiarize AutoCAD with all the basic commands for creating drawings
3. Adopt the principles of technical documentation in the organization
4. Draw a machine element in orthogonal and isometric projection in AutoCAD
5. Create a prototype drawing in AutoCAD
6. Connect orthogonal 2D and spatial isometric 3D projections
7. Draw the entire technical drawing in AutoCAD
8. Create a basis for designing schemes and floor plans

1.4. Course content

1. Standardization and standards, paper formats, technical letter, scale, components
2. Presentation of shapes with the basics of design geometry, spatial projection, orthogonal projection
3. Drawing projections using basic drawing commands and changing drawings
4. Advanced programs for processing a large number of documents, images and drawings
5. Creation of orthogonal projections based on a complex isometric drawing
6. Creation of orthogonal projections with standard sections and holes
7. Creating an orthogonal projection of a symmetrical machine part with the help of mirroring and stretching commands
8. Layout schematic views and block elements
9. Editing existing schematic views in AutoCAD

9.5. Teaching methods	☒ lectures	☐ individual exercises

	☐ seminars and workshops ☒ exercises ☒ distance learning	☒ multimedia and network ☒ laboratory ☐ mentoring work ☐ other _____

9.6. Students' obligations to take the exam

Two control tasks in AutoCAD

9.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Written verification 1	Written verification 2	Min	Max
LO1	5%	-	-	2.5%	5%
LO2	5%	-	-	2.5%	5%
LO3	5%	-	-	2.5%	5%
LO4	5%	25%	-	15%	30%
LO5	10%	-	-	5%	10%
LO6	5%	-	-	2.5%	5%
LO7	10%	-	-	5%	10%
LO8	5%	-	25%	15%	30%
Share in ECTS	2	1	1	-	4
Total	50%	25%	25%	50%	100%

Final Exam:

Learning outcome	Written Exam	Min	Max
LO1	5%	2.5%	5%
LO2	5%	2.5%	5%
LO3	5%	2.5%	5%
LO4	30%	15%	30%
LO5	10%	5%	10%
LO6	5%	2.5%	5%
LO7	10%	5%	10%
LO8	30%	15%	30%
Share in ECTS	4	-	4
Total	100%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
The results that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E
60,00-74,99	good (3)	C
75,00-89,99	very good (4)	B
90,00-100,00	excellent (5)	A

9.8. Obligatory literature

1. E-learning materials
2. Herold,Z. (1994). Inženjerska grafika, Inženjerski priručnik.Zagreb: Školska knjiga

9.9. Additional literature

1. Koludrović (1997). Tehničko crtanje u slici s kompjuterskim aplikacijama.Rijeka:Autorska naknada Koludrović Ć. I. R.
2. Herold, Z. i Žeželj,D. (2006).Inženjerska grafika - Metodička vježbenica. Zagreb:FSB
3. Opalić, M., Kljajin,M. i Sebastijanović, S. (2003). Tehničko crtanje. Čakovec: Zrinski

9.10. Quality monitoring method

Teaching evaluations; student survey.

Istarsko veleučilište
Università Istriana
di scienze applicate

Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Applied Mathematics**	
Course status	Mandatory	
Year	1.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	5
	Number of hours in the semester (L+E+S)	45+15+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

The aim of the course is to ensure the acquired basic knowledge in the field of applied mathematics necessary for mastering the material of other study subjects in which mathematical analysis and modeling of engineering systems are carried out, and at the same time to interest students in the independent improvement and improvement of the competences acquired during the study by applying the mathematical methods covered.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Create a computer algorithm using the Python programming language.
2. Model the physical system with a 1st-order differential equation.
3. Model the physical system with a 2nd-order differential equation.
4. Apply numerical integration of ordinary differential equations.
5. Present the model of the engineering system to the expert and non-expert public.

1.4. Course content

1. Introduction.
2. Python.
3. Differential and integral calculus.
4. Ordinary differential equations of the 1st order.
5. Ordinary differential equations of the 2nd order.
6. Systems of ordinary differential equations.
7. Numerical approximation of derivatives.
8. Explicit numerical algorithms.
9. Implicit numerical algorithms.
10. Solving the system of nonlinear algebraic equations.
11. Calibration of the numerical model.
12. Optimization problems.
13. Nature-inspired optimization algorithms.
14. Stochastic processes.
15. Presentation of seminar papers.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☒ distance learning	☐ individual exercises ☐ multimedia and network ☐ laboratory ☐ mentoring work ☒ other independent programming tasks

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Program task (program)	Program task (seminar)	Program task (presentation)	Min	Max
LO1	2%	15%	5%	-	11%	22%
LO2	2%	15%	5%	-	11%	22%
LO3	2%	15%	5%	-	11%	22%
LO4	2%	15%	5%	-	11%	22%
LO5	2%	-	-	10%	6%	12%
Share in ECTS	0.5	3	1	0.5	-	5
Total	10%	60%	20%	10%	50%	100%

A prerequisite for access to the final exam is a submitted and positively evaluated program task.
Final Exam:

Learning outcome	Oral Exam	Min	Max
LO1	20%	10%	20%
LO2	20%	10%	20%
LO3	20%	10%	20%
LO4	20%	10%	20%
LO5	20%	10%	20%
Share in ECTS	5	-	5
Total	100%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
The results that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E
60,00-74,99	good (3)	C
75,00-89,99	very good (4)	B
90,00-100,00	excellent (5)	A

1.8. Obligatory literature

1. Kreyszig E. (2006). Advanced Engineering Mathematics (9th ed.), John Wiley & Sons Inc.
2. Stroud K.A., Booth D. (2013). Engineering Mathematics (7th ed.), Palgrave Macmillan.

1.9. Additional literature

1. Kalbaugh D.V. (2018).Differential Equations for Engineers: The Essentials (1st ed.), Taylor & Francis.

1.10. Quality monitoring method

Teaching evaluations; student survey.

Istarsko veleučilište
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Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Fundamentals of Electrical Engineering**	
Course status	Mandatory	
Year	1.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	6
	Number of hours in the semester (L+E+S)	30+45+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

Understanding of basic terms from electricity and electromagnetism fields. Ability of DC and AC circuit's solving. Ability of measurement of basic electrical values in electrical circuits. Ability of analysis, basic computing skills.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Describe and apply basic electrostatic laws.
2. Analyzing DC electrical circuits.
3. Describe and apply basic electromagnetism laws.
4. Analyzing AC electrical circuits.
5. Planning and implement measurement in electrical circuits.

1.4. Course content

1. Basic terms and laws from electrostatic: force, field, potential.
2. Capacitor's networks.
3. Basic terms and laws of DC circuits.
4. Analysis of DC circuits: solving methods and theorems.
5. Basic terms and laws from electromagnetism.
6. Magnetic materials and circuits.
7. Basic terms and laws of AC circuits.
8. Analysis of AC circuits: solving methods and theorems.
9. Power and resonance in AC circuits.
10. Three-phase system.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☒ distance learning	☒ individual exercises ☐ multimedia and network ☒ laboratory ☐ mentoring work ☐ other _____

1.6. Students' obligations to take the exam

- Write essay on given subject
- Do laboratory exercises

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Written verification	Laboratory exercises	Min	Max
LO1	-	15%	-	5%	15%
LO2	-	25%	5%	18%	30%
LO3	-	15%	-	5%	15%
LO4	-	25%	5%	18%	30%
LO5	-	5%	5%	4%	10%
Share in ECTS	-	5.1	0.9	-	6
Total	0%	85%	15%	50%	100%

Final Exam:

Learning outcome	Written Exam	Min	Max
LO1	15%	5%	15%
LO2	30%	18%	30%
LO3	15%	5%	15%
LO4	30%	18%	30%
LO5	10%	4%	10%
Share in ECTS	6	-	6
Total	100%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
The results that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E
60,00-74,99	good (3)	C
75,00-89,99	very good (4)	B
90,00-100,00	excellent (5)	A

1.8. Obligatory literature

1. N. Stojković, V. Sučić, S. Vlahinić, *Osnove elektrotehnike I*, Tehnički fakultet Sveučilišta u Rijeci i Fintrade, Rijeka, 2007.

2. N. Stojković, S. Vlahinić, V. Sučić, *Osnove elektrotehnike II*, Tehnički fakultet Sveučilišta u Rijeci i Fintrade, Rijeka, 2007.
1.9. Additional literature
1. V. Pinter, Osnove elektrotehnike - Knjiga prva, Tehnička knjiga, Zagreb, 1980. 1. V. Pinter, Osnove elektrotehnike - Knjiga druga, Tehnička knjiga, Zagreb, 1989.
1.10. Quality monitoring method
Teaching evaluations; student survey.

Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	Materials and Manufacturing Processes	
Course status	Mandatory	
Year	1.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	5
	Number of hours in the semester (L+E+S)	30+30+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

The goal of this course is to determine the composition and structure of materials, state diagrams, the basics of solidification and basic properties of materials, heat treatment procedures of materials, the basics of production procedures for the production of metallic and non-metallic artefacts, and differentiation and professional classification in application.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Differentiate basic groups and subgroups of materials and production procedures suitable for individual materials, material properties important for machine element and construction.
2. Relate the chemical composition, microstructure and properties of the material.
3. Distinguish between shaping and processing procedures without particle separation (casting procedures, plastic deformation procedures) and processing procedures with particle separation, welding procedures, polymer processing procedures and additive procedures.
4. Classify the production processes of metal and polymer products according to different criteria.
5. Propose the type of material, the technological processing procedure and the most important properties for the specific structural element and exploitation conditions.

1.4. Course content

1. Introduction. Structure of substances and chemical bonds. Material properties and their determination. Static tensile test, hardness, impact fracture. Systematization of materials.
2. Metal heat treatment procedures: annealing, tempering, improvement and surface modification procedures.
3. Properties, production and application of metal materials.
4. Properties, production and application of structural ceramics.
5. Properties, production and application of polymers and composites.
6. Basics of casting technology. Casting quality and defects.
7. Physical basics of shaping by deformation, procedures: forging and rolling.
8. The principle of making a welded joint, joining techniques, division of welding procedures.

9. Processing procedures by separating particles with tools of defined geometry and tools of undefined geometry.
10. Basic principles of corrosion protection.

1.5. Teaching methods	☒ lectures ☒ seminars and workshops ☒ exercises ☒ distance learning	☒ individual exercises ☐ multimedia and network ☒ laboratory ☐ mentoring work ☐ other _____

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Task/Seminar/ Presentation	Laboratory exercises	Written verification 2	Min	Max
LO1	2 %	-	-	10 %	6 %	12 %
LO2	2 %	-	30 %	-	16 %	32 %
LO3	4 %	-	-	10 %	7 %	14 %
LO4	2 %	-	-	10 %	6 %	12 %
LO5	-	30 %	-	-	15 %	30 %
Share in ECTS	0.5	1.5	1.5	1.5	-	5
Total	10 %	30 %	30 %	30 %	50%	100%

Final Exam:

Learning outcome	Written Exam	Oral Exam	Min	Max
LO1	10 %	2 %	6 %	12 %
LO2	20 %	12 %	16 %	32 %
LO3	10 %	4 %	7 %	14 %
LO4	10 %	2 %	6 %	12 %
LO5	20 %	10 %	15 %	30 %
Share in ECTS	3.5	1.5	-	5
Total	70 %	30 %	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
The results that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E
60,00-74,99	good (3)	C
75,00-89,99	very good (4)	B
90,00-100,00	excellent (5)	A

1.8. Obligatory literature

1. E-learning materials (lectures and exercises)

1.9. Additional literature

1. Cukor, G. (2008). Proizvodne tehnologije, Sveučilište u Rijeci: Tehnički fakultet
2. Smoljan, B. (1999).Toplinska obrada čelika, sivog i nodularnog lijeva. Sveučilište u Rijeci, Tehnički fakultet
3. Povrzanović, A. (1996). Obrada metala deformiranjem. Sveučilište u Zagrebu, Fakultet strojarstva i brodogradnje
4. Bauer, B., Mihalić, I. (2012). Osnove tehnologije lijevanja. Sveučilište u Zagrebu, Fakultet strojarstva i brodogradnje
5. Math, M. (1999). Uvod u tehnologiju oblikovanja deformiranjem. Sveučilište u Zagrebu, Fakultet strojarstva i brodogradnje
6. Cebalo, R.(2000). Alatni strojevi – odabrana poglavlja. Sveučilište u Zagrebu, Fakultet strojarstva i brodogradnje
7. Šuvar, Š., (1991).Obrada odvajanjem čestica. Zagreb: Školska knjiga
8. Manufacturing processes & Materials, fourth edition, Book Copyright 2000 by Society of Manufacturing Engineers, Printed in the United States of America
9. The Internet, everything that is available from the course

1.10. Quality monitoring method

Teaching evaluations; student survey.

Istarsko veleučilište
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Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Matlab**	
Course status	Mandatory	
Year	1.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	3
	Number of hours in the semester (L+E+S)	15+30+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

The goal of the course is to acquire the knowledge necessary for using the Matlab and Simulink software packages. It involves demonstrating and solving real computational problems and tasks in Matlab.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Declare different types of variables in Matlab and perform basic operations on variables.
2. Plot graphs of given mathematical functions in Matlab using M-functions and scripts.
3. Solve algebraic, non-algebraic, and differential equations, as well as systems of equations using Matlab's symbolic package.
4. Plot graphs of given mathematical functions in Matlab using the symbolic package.
5. Write simple computational programs in Matlab.
6. Solve algebraic, non-algebraic, and differential equations through simulation in Simulink.

1.4. Course content

1. Starting and organizing Matlab, and understanding variables, operations, and operators in Matlab
2. Commands, decisions, and loops
3. Elementary mathematical functions in Matlab; Functions for processing vectors and matrices; Functions for processing character strings; Functions for working with polynomials
4. M-functions and scripts; Functions in Matlab for 2D and 3D graphical representation
5. Basic functions of the symbolic package; Functions for mathematical analysis in the symbolic package
6. Linear algebra functions in the symbolic package; Functions for solving algebraic and differential equations
7. Integral transformations (Fourier, Laplace); Simplification and modification of symbolic expressions
8. Graphical functions of the symbolic package
9. Basic techniques for working in Simulink and an introduction to simulations of dynamic systems in Simulink
10. Examples of dynamic system simulations in Simulink

1.5. Teaching methods	☒ lectures ☐ seminars and workshops	☒ individual exercises ☒ multimedia and network

	☒ exercises ☒ distance learning	☒ laboratory ☐ mentoring work ☐ other _____

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations. Attendance at lectures and exercises. Two assessments in Matlab and the completion of a programming assignment. Passing the theoretical part through an oral examination.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Written verification 1	Written verification 2	Min	Max
LO1	10%	-	-	5%	10%
LO2	-	22%	-	11%	22%
LO3	-	-	22%	11%	22%
LO4	26%	-	-	13%	26%
LO5	10%	-	-	5%	10%
LO6	10%	-	-	5%	10%
Share in ECTS	1.68	0.66	0.66	-	3
Total	56%	22%	22%	50%	100%

Final Exam:

Learning outcome	Written Exam	Oral Exam	Min	Max
LO1	-	-	-	-
LO2	50%	-	25%	50%
LO3	-	50%	25%	50%
LO4	-	-	-	-
LO5	-	-	-	-
LO6	-	-	-	-
Share in ECTS	1.5	1.5	-	3
Total	50%	50%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
The results that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E

	60,00-74,99	good (3)	C	
	75,00-89,99	very good (4)	B	
	90,00-100,00	excellent (5)	A	

1.8. Obligatory literature

1. E-learning materials
2. Ž. Ban, J. Matuško, I. Petrović: Primjena programskog sustava MATLAB za rješavanje tehničkih problema, Graphis, Zagreb, 2010

1.9. Additional literature

1. B. Kovačić: Matematički alati u elektrotehnici, udžbenik, Tehničko veleučilište u Zagrebu, Zagreb, 2013.
2. B. H. Hahn, D. T. Valentine Essential MATLAB for Engineers and Scientists Fifth Edition, Academic Press Elsevier, USA 2013

1.10. Quality monitoring method

Teaching evaluations; student survey.

Istarsko veleučilište
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Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Mechatronic Machine Elements**	
Course status	Mandatory	
Year	1.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	5
	Number of hours in the semester (L+E+S)	30+30+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

After attending and passing the course, students are trained to apply knowledge and skills that enable proper selection, calculation, design, presentation on technical drawing and application of non-detachable and detachable joints, elements for power and motion transmission, seals, and understanding of the course Computer Aided Design, as well as other courses that include the application of standard machine elements and components.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Calculate the appropriate dimension, fit, and tolerance of the shape and dimensions of standard machine elements.
2. Calculate the stresses of standard machine elements.
3. Choose criteria for the dimensioning and design of standard machine elements.
4. Apply standardized procedures for the control calculation of the limit-load of machine elements.
5. Solve the given constructional design problems.

1.4. Course content

1. Texture of technical surfaces.
2. Tolerances of measurement and fit.
3. Tolerances of shapes and dimensions.
4. The basics of calculating the strength of machine elements.
5. Decomposable joints: thread definition, markings, bolts, spring elements, hub joints, pin joints, and cottered joints.
6. Indecomposable joints: welded, glued, soldered, riveted, clamped.
7. Axles and shafts: calculation, choice of materials, design.
8. Sliding and roller bearings: calculation, selection, lubrication, shaping of the bearing area.
9. Couplings: types, application.
10. Power and motion transmissions: belt, chain, gear, friction.
11. Sealing: static, dynamic.
12. Solving numerical problems.
13. Constructional design exercises: solving project tasks.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☒ distance learning	☒ individual exercises ☐ multimedia and network ☒ laboratory ☐ mentoring work ☐ other _____

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Project task	Written verification	Oral exam	Min	Max
LO1	2.5%	-	12.5%	2%	8.5%	17%
LO2	2.5%	-	12.5%	3%	9%	18%
LO3	2.5%	-	12.5%	3%	9%	18%
LO4	2.5%	-	12.5%	2%	8.5%	17%
LO5	-	30%	-	-	15%	30%
Share in ECTS	0.5	1.5	2.5	0.5		5
Total	10%	30%	50%	10%	50%	100%

Final Exam:

Learning outcome	Project task	Written Exam	Oral exam	Min	Max
LO1	-	12%	5%	8.5%	17%
LO2	-	13%	5%	9%	18%
LO3	-	13%	5%	9%	18%
LO4	-	12%	5%	8.5%	17%
LO5	30%	-	-	15%	30%
Share in ECTS	1,5	2,5	1	-	5
Total	30%	50%	20%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
The results that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F

50,00-59,99	sufficient (2)	D, E	
60,00-74,99	good (3)	C	
75,00-89,99	very good (4)	B	
90,00-100,00	excellent (5)	A	

1.8. Obligatory literature

1. Materials from e-learning.
2. Decker, K.-H. (2006). Elementi strojeva. Zagreb: Golden marketing - Tehnička knjiga
3. Križan, B. (2008). Osnove proračuna i oblikovanja konstrukcijskih elemenata. Zagreb: Školska knjiga
4. Jelaska, D. (2005). Elementi strojeva. Split: FESB, Split

1.9. Additional literature

1. Križan, B., Franulović, M., Zelenika, S. (2012). Konstrukcijski elementi - Zbirka zadataka. Rijeka: Tehnički fakultet
2. Orlić, Ž., Cvitković, J. (1992). Prednapregnuti vijčani spojevi. Rijeka: Tehnički fakultet
3. Kraut, B. (1988). Strojarski priručnik. Zagreb: Tehnička knjiga
4. Various authors (2009). Krautov strojarski priručnik. Zagreb: Sajema
5. Budynas, R.G., Nisbett, J.K. (2008). Shigley's Mechanical Engineering Design. NY: McGraw-Hill
6. Catalogs of manufacturers of machine elements related to the subject content.
7. ISO, EN, DIN, HRN standards related to the subject content.

1.10. Quality monitoring method

Teaching evaluations; student survey.

Istarsko veleučilište
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Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Physics**	
Course status	Mandatory	
Year	1.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	6
	Number of hours in the semester (L+E+S)	30+45+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

Understanding of physical phenomena and quantities used in the study of mechatronics, described in the broader context of the fundamental laws of physics.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Analyze and adopt the concepts and laws of classical mechanics.
2. Analyze and adopt the concepts and laws of thermodynamics.
3. Analyze and adopt the concepts and laws of electricity and magnetism.
4. Analyze and adopt the concepts and laws of vibration, waves and optics.
5. Analyze and adopt the concepts and laws of modern physics (special theory of relativity, quantum mechanics, nuclear physics).

1.4. Course content

A. Lecture content:

1. Physical quantities and units, introduction to differential calculus.
2. Motion along a straight line, free fall, motion along a curve and a circle.
3. Newton's axioms, momentum, force impulse, conservation of momentum.
4. Work and power, energy, conservation of energy.
5. Rotation of a rigid body.
6. Movement in the gravitational field.
7. Fluids, pressure, fluid motion,
8. Harmonic vibration, waves.
9. Heat and temperature, ideal gas, change of internal energy by heat (conduction, convection, radiation).
10. Laws of thermodynamics, Carnot circular process.
11. Electric charge, Coulomb's law, electric field, potential, capacitors and electric field energy.
12. Electric current, Ohm's law, Kirchhoff's rules, work and power of electric current.
13. Magnetism, magnetic field of electric current, magnetic flux, Ampere force, Lorentz force.
14. Electromagnetic induction, Faraday's law of EM induction, alternating current and voltage, reactive resistances, alternating current power.
15. Laws of geometric optics - light reflection, mirrors, light refraction - diopters, lenses.
16. Wave properties of light - deflection and interference of light.

17. Wave-particle nature of light and matter – Planck quantum of radiation, photoelectric effect, de Broglie's hypothesis, electron bending.
18. Models of atoms, emission and absorption of photons, stimulated emission (lasers), basics of photonics.
19. Basics of the special theory of relativity (postulates, time dilation, length contraction, relativistic summation of velocities, relativistic energy and amount of motion, rest energy).
20. Fundamentals of nuclear physics (structure of the atomic nucleus, mass defect, conservation laws in nuclear reactions, radioactivity, nuclear energy, fusion and fission of atomic nuclei).

B. Content of auditory exercises:
1. Directional movement.
2. Shots.
3. Movement in a circle.
4. Newton's laws.
5. Work, strength, energy.
6. Collisions.
7. Rotation of a rigid body
9. Movement in the gravitational field.
10. Thermal stretching. Ideal gas laws. Mechanisms of heat transfer (conduction, convection, radiation).
11. Laws of thermodynamics. Carnot circular process.
12. Electric field.
13. Current circuits.
14. Alternating current.
15. Shaking, waves.
16. Geometric optics, wave optics.
17. Dual nature of matter and radiation, atom.
18. Special theory of relativity.
19. Nuclear physics.

C. Content of laboratory exercises:
1. Measurement and processing of measurement results.
2. Measurement with a caliper and a micrometer screw.
3. Determining the acceleration of gravity with a mathematical pendulum.
4. Determination of the internal resistance of the source.
5. Determination of solid and liquid density.
6. Temperature and heat capacity measurements.
7. Determination of the latent heat of evaporation.
8. Determination of the radius of curvature of a spherical mirror.
9. Determining the wavelength of light using the deflection on the optical grating.
10. Photoelectric effect – determination of Planck's constant.
11. Exam from laboratory exercises.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☒ distance learning	☒ individual exercises ☒ multimedia and network ☒ laboratory ☐ mentoring work ☐ other _____

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Exercises	Laboratory exercises	Task	Min	Max
LO1	4%	14%	16%	2%	18%	36%
LO2	1%	4%	8%	2%	7.5%	15%
LO3	2%	12%	4%	2%	10%	20%
LO4	1%	5%	8%	2%	8%	16%
LO5	2%	5%	4%	2%	6.5%	13%
Share in ECTS	0.6	2.4	2.4	0.6	-	6
Total	10%	40%	40%	10%	50%	100%

Final Exam:

Learning outcome	Written Exam	Oral Exam	Min	Max
LO1	12.5%	12.5%	12.5%	25%
LO2	7.5%	7.5%	7.5%	15%
LO3	10%	10%	10%	20%
LO4	10%	10%	10%	20%
LO5	10%	10%	10%	20%
Share in ECTS	3	3	-	6
Total	50%	50%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
Learning outcomes that the student does not pass during the continuous assessment, will be taken during the examination period.
The prerequisite for taking the exam is an accepted and evaluated seminar paper and a passed exam in laboratory exercises.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E
60,00-74,99	good (3)	C
75,00-89,99	very good (4)	B
90,00-100,00	excellent (5)	A

1.8. Obligatory literature

1. E-learning materials from Merling system
2. T. Petković, Zadaci iz fizike (za studente studija energetske učinkovitosti i obnovljivih izvora u Šibeniku, Element, Zagreb

1.9. Additional literature
1. R. A. Serway, C. Vuille: College Physics, Brooks/Cole, Boston, USA (dostupno kao pdf na web-u: https://www.bau.edu.jo/UserPortal/UserProfile/PostsAttach/57751_5218_1.pdf)
1.10. Quality monitoring method
Teaching evaluations; student survey.

Istarsko veleučilište
Università Istriana
di scienze applicate

Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Computer Aided Design**	
Course status	Mandatory	
Year	2.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	5
	Number of hours in the semester (L+E+S)	30+45+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

Acquisition and application of advanced knowledge and skills in the development and design elaboration of machine elements and assemblies with intensive use of current software tools and applications.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. State and describe the basic terms of CAE and the ways and types of its application in product development.
2. Describe the current state and trends and directions of development of CAE methods and tools.
3. Define the types of product models and the features it should have with regard to its purpose and the stage of development products.
4. Analyze examples of computer models of products.
5. Characterize the computer modeling of elements and circuits and the creation of blueprints and accompanying documentation.
6. Describe the features of functional and numerical analysis of elements and circuits
7. Describe communication methods and information transfer features between individual CAE systems and applications.
8. Generate a computer model of the product adapted for a specific CAE application and analyze it as part of solving the project task.

1.4. Course content

- Introduction and basic concepts of CAE (Computer Aided Engineering)
- Overview of the current situation in the field of CAE, trends and directions in the development of methods and software tools
- Product Lifecycle Management (PLM)
- Product development and elaboration with the application of current methods and software tools (concurrent engineering, teamwork, automation and integration of individual parts of the construction process)
- Modeling of three-dimensional (3D) elements - requirements, prerequisites, techniques. Modeling of three-dimensional (3D) circuits. Creation of drawings and accompanying documentation
- Functional analysis of elements and assemblies (masses, moments of inertia, center of gravity, folding)

- Numerical structural analysis of construction (static, kinematic, dynamic), topology optimization, generative design. Rapid prototyping technology, 3D printing, 3D scanning, digital image correlation)
- Communication and exchange of information and data between individual CAE applications
- Overview of typical software tools and modules for other CAE purposes

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☒ distance learning	☒ individual exercises ☒ multimedia and network ☐ laboratory ☐ mentoring work ☐ other _____

1.6. Students' obligations to take the exam

Solving project tasks in class and at home, independent study

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Project exam	Min	Max
LO1	0.5%	4.5%	2.5%	5%
LO2	0.5%	4.5%	2.55	5%
LO3	0.5%	4.5%	2.5%	5%
LO4	1%	9%	5%	10%
LO5	2%	18%	10%	20%
LO6	0.5%	4.5%	2.5%	5%
LO7	1%	9%	5%	10%
LO8	4%	36%	20%	40%
Share in ECTS	0.5	4.5	-	5
Total	10%	90%	50%	100%

Final Exam:

Learning outcome	Written Exam	Min	Max
LO1	5%	2.5%	5%
LO2	5%	2.55	5%
LO3	5%	2.5%	5%
LO4	10%	5%	10%
LO5	20%	10%	20%
LO6	5%	2.5%	5%
LO7	10%	5%	10%
LO8	40%	20%	40%
Share in ECTS	5	-	5
Total	100%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the

defined minimum for each learning outcome.
The results that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E
60,00-74,99	good (3)	C
75,00-89,99	very good (4)	B
90,00-100,00	excellent (5)	A

1.8. Obligatory literature

1. E-learning materials
2. DS SolidWorks instructions

1.9. Additional literature

1. Kljajin, M., Karakašić, M. (2012). Modeliranje primjenom računala. Slavonski Brod: SFSB
2. Slade, I. - Vježbe iz konstruiranja računalom - DS SolidWorks
3. Lee, K (1999). Principles of CAD / CAM / CAE Systems. Addison Wesley Longman, Reading, Massachusetts, 1999

1.10. Quality monitoring method

Teaching evaluations; student survey.

Istarsko veleučilište
Università Istriana
di scienze applicate

Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Dynamic System Modelling**	
Course status	Mandatory	
Year	2.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	5
	Number of hours in the semester (L+E+S)	45+15+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

The goal of the course is to ensure the acquisition of basic knowledge in the field of modelling dynamic systems (described by ordinary differential equations) necessary for the independent creation of models and simulations of engineering systems, and at the same time to interest students in the independent improvement and improvement of the competencies acquired within this course.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Create a dynamic system model in the Scilab program.
2. Define the matrix record of the system using the method of state variables.
3. Define the transfer function of the system using the Laplace transform.
4. Implement and calibrate the PID controller in the system model.
5. Present the system model to the expert and non-expert public.

1.4. Course content

1. Introduction.
2. Linearization of the system.
3. Scilab/Xcos (https://www.scilab.org/).
4. State variables. 5. Portable function.
5. Automatic regulation of the system.
6. Automatic system stabilization.
7. Modelling of mechanical systems (mass translation).
8. Modelling of mechanical systems (mass rotation).
9. Modelling of mechanical systems (combined mass motion).
10. Modelling of electrical systems.
11. Modelling of hydraulic systems.
12. Modelling of thermal systems.
13. Microcontrollers.
14. Presentation of program tasks.

1.5. Teaching methods	☒ lectures	☐ individual exercises

	☐ seminars and workshops ☒ exercises ☒ distance learning	☐ multimedia and network ☐ laboratory ☐ mentoring work ☒ other independent programming tasks

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Programming task (program)	Programming task (seminar)	Programming task (presentation)	Min	Max
LO1	2%	15%	5%	-	11%	22%
LO2	2%	15%	5%	-	11%	22%
LO3	2%	15%	5%	-	11%	22%
LO4	2%	15%	5%	-	11%	22%
LO5	2%	-	-	10%	6%	12%
Share in ECTS	0.5	2.5	0.5	0.5	-	5
Total	10%	60%	20%	10%	50%	100%

Final Exam:

Learning outcome	Oral Exam	Min	Max
LO1	22%	11%	22%
LO2	22%	11%	22%
LO3	22%	11%	22%
LO4	22%	11%	22%
LO5	12%	6%	12%
Share in ECTS	5	-	5
Total	100%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
Learning outcomes that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E

60,00-74,99	good (3)	C
75,00-89,99	very good (4)	B
90,00-100,00	excellent (5)	A

1.8. Obligatory literature

1. Robert H.B. (2002). The Mechatronics Handbook, The University of Texas at Austin.
2. Karnopp D.C., Margolis D.L., Rosenberg R.C. (2012). System Dynamics: Modeling, Simulation, and Control of Mechatronic Systems, Wiley & Sons.

1.9. Additional literature

1. Lyshevski, S. E. (2001). Control Systems Theory With Engineering Applications, Birkhäuser, Boston, MA.

1.10. Quality monitoring method

Teaching evaluations; student survey.

Istarsko veleučilište
Università Istriana
di scienze applicate

Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Electronic Elements and Circuits**	
Course status	Mandatory	
Year	2.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	5
	Number of hours in the semester (L+E+S)	30+30+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

After completing and passing the course, students are trained to apply knowledge and skills from electronic elements and circuits that allow application in solving engineering problems in the field of mechatronics.

The course enables the understanding of materials from the course "Communication Techniques in Mechatronics" and other subjects in the undergraduate professional study of mechatronics, which include the use of electronic circuits.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Analyze the properties of semiconductors that enable application in electronic elements and circuits.
2. Compare the mode of operation of basic semiconductor components.
3. Recommend diodes when making rectifiers and stabilizers.
4. Analyze the properties of basic electronic circuits.
5. Combine analog-digital and digital-analog converters.
6. Recommend the selection of computer components for optimal functionality.
7. Determine (proposal/solution) solution including digital logic circuit, combinational and sequential logic circuit, circuit with bistables, integrated logic circuit.

1.4. Course content

Fundamentals of semiconductor electronics. Basic semiconductor elements. Bipolar transistor. Unipolar transistor, thyristors. Electronic circuits, rectifiers, voltage stabilizers. Amplifiers. Differential amplifier, operational amplifier. Feedback circuits, circuits with operational amplifiers. Switching circuits, switches. Assemblies for receiving non-electric quantities. Integrated circuits, combinational circuits, logical algebra. Sequential digital circuits. Digital/analogic /digital converters. Computers. Connecting computers to processes.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises	☐ individual exercises ☐ multimedia and network ☒ laboratory

	☐ distance learning	☐ mentoring work ☐ other _____

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Written verification 1	Written verification 2	Laboratory exercises	Min	Max
LO1		10%			5%	10%
LO2		10%		5%	7.5%	15%
LO3	5%			5%	5%	10%
LO4		10%	10%	5%	12.5%	25%
LO5			10%		5%	10%
LO6	5%		10%		7.5%	15%
LO7			10%	5%	7.5%	15%
Share in ECTS	0.5	1.5	2	1		
Total	10%	30%	40%	20%	50%	100%

Final Exam:

Learning outcome	Written Exam	Min	Max
LO1	10%	5%	10%
LO2	10%	5%	10%
LO3	15%	7,5%	15%
LO4	25%	12,5%	25%
LO5	10%	5%	10%
LO6	15%	7,5%	15%
LO7	15%	7,5%	15%
Share in ECTS	5	-	5
Total	100%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
The results that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E

60,00-74,99	good (3)	C
75,00-89,99	very good (4)	B
90,00-100,00	excellent (5)	A

1.8. Obligatory literature

1. P. Biljanović: Poluvodički elektronički elementi, Školska knjiga, Zagreb 2004. – selected chapters
2. Grbac Babić S.: Presentations from lectures and exercises and other teaching materials - available online through the Merlin e-learning system

1.9. Additional literature

1. R. C. Jaeger: Microelectronic circuit design, McGraw-Hill
2. Manufacturer's catalogues materials and Data Sheets

1.10. Quality monitoring method

Teaching evaluations; student survey.

Istarsko veleučilište
Università Istriana
di scienze applicate

Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**English Language in Mechatronics**	
Course status	Mandatory	
Year	2.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	4
	Number of hours in the semester (L+E+S)	30+30+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

The goal of the course is to pay attention to the most important parts of English grammar that can enable students to improve oral and written communication within the profession, taking into account the interdisciplinary nature of the profession itself. Since by studying mechatronics the student acquires the competence of basic engineering knowledge from various disciplines, such as mechanical engineering, industrial electronics and applied informatics, the goal of the course is to provide an integrated acquisition of knowledge that provides participants with basic information about various work tasks in this field in English.
The aim of the course is also to prepare and train students for oral and written business communication, and for independent presentation (of themselves/company) in English.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Apply the basic principles of technical (professional) English;
2. Compare general and professional language in spoken and written communication;
3. Apply and understand different technical (professional) English terminology;
4. Construct a resume and job application;
5. Critically assess the essential items of a job interview in English;
6. Present and comment on topics from the field of profession;
7. Connect expressions used in business communication (written and oral);

1.4. Course content

Lecture content:
1. Introduction to communication;
2. Business English and use of formal English;
3. Occupations and titles in the field of mechatronics and informatics, description of jobs in different countries;
4. Acronyms and abbreviations in business communication;
5. Phraseology in telephoning;
6. Curriculum vitae;
7. Job application;

8. Job interview;

Content of exercises:

1. Research and development; vocabulary exercises;
2. Research and development; grammatical forms;
3. Grammatical forms, vocabulary exercises - Overview of Mechatronics;
4. Dialogue units - what is mechatronics (What is Mechatronics?);
5. Technical development; practicing grammatical structures;
6. Formation of words in the English language - approach to mechatronic design (Mechatronic Design Approach)
7. Writing a resume;
8. Job interview.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☒ distance learning	☒ individual exercises ☐ multimedia and network ☒ laboratory ☐ mentoring work ☐ other _____

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Written verification 1	Written verification 2	CV and cover letter	Min	Max
LO1	1%	10%	-	-	5%	11%
LO2	1%	15%	-	-	8%	16%
LO3	1%	-	10%	-	6%	11%
LO4	2%	-	-	20%	11%	22%
LO5	2%	-	-	20%	11%	22%
LO6	1%	-	15%	-	8%	16%
LO7	2%	-	-	-	1%	2%
Share in ECTS	0.4	1	1	1.6	-	4
Total	10%	25%	25%	40%	50%	100%

Final Exam:

Learning outcome	CV and cover letter	Oral Exam	Min	Max
LO1	-	12%	6%	12%
LO2	-	12%	6%	12%
LO3	-	12%	6%	12%
LO4	20%	-	10%	20%
LO5	20%	-	10%	20%

LO6	-	12%	6%	12%
LO7	-	12%	6%	12%
Share in ECTS	1.6	2.4	-	4
Total	40%	60%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
The results that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E
60,00-74,99	good (3)	C
75,00-89,99	very good (4)	B
90,00-100,00	excellent (5)	A

1.8. Obligatory literature

1. Materials and exercises posted on the Merlin e-learning platform
2. Selected chapters from additional literature

1.9. Additional literature

1. Bishop, R. H. (2002). The Mechatronics Handbook. Boca Raton: CRC Press.
2. Lannon, J.M., Gurak, L.J. (2015). Technical Communication: Pearson Education Limited
3. Lannon, J.M., Gurak, L.J. (2007). A Concise Guide to Technical Communication: Pearson Education Limited
4. Hybels, S., Weaver II, R.L. (2012). Communicating Effectively: The McGraw-Hill Companies Inc.
5. Powel, D., Walker E. (2008). Grammar Practice for Upper Intermediate Students with key: Pearson Education Limited
6. Swan, M. (2016). Practical English Usage: Oxford University Press.
7. Solórzano, H., Frazier, L. (2009). Contemporary Topics 1: Intermediate Academic Listening and Note-Taking Skills: Pearson Education Limited
8. Sahanaya, W., Lindeck, J., Stewart, R. (2012). Preparation and Practice: Reading and Writing. Academic Module: Oxford University Press, ANZ English
9. Oshima, A., Hogue, A. (2006). Writing Academic English: Pearson Longman
10. Riordan, Daniel G. (2014) Technical Report Writing Today, Cengage Learning.

1.10. Quality monitoring method

Teaching evaluations; student survey.

Istarsko veleučilište
Università Istriana
di scienze applicate

Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Essentials of Mechanisms**	
Course status	Mandatory	
Year	2.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	5
	Number of hours in the semester (L+E+S)	30+30+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

To qualify students to solve engineering tasks related to kinematics and dynamics of machines, vehicles, robots, manipulators, etc.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Analyze the structure of mechanisms and calculate their mobility.
2. Analyze plane mechanisms using kinematics and dynamics methods and calculate parameters for their balancing.
3. Adopt and apply different methods of synthesis of planar mechanisms.
4. To analyze the movement of the slider in curved mechanisms, to set criteria for selecting the optimal laws of motion and to carry out a kinematic and dynamic analysis of curved mechanisms.
5. Model and analyze gear mechanisms with fixed axes and planetary and differential gear transmissions.

1.4. Course content

- Kinematics of a particle and a rigid body. Determination of speeds and accelerations for different types of motion.
- Dynamics of a particle, system of particles and a rigid body. Basic laws. Analytical and energetic methods.
- Definitions of mechanisms and machines. Kinematic couples, chains and degrees of freedom of motion. Designing mechanisms. Synthesis of mechanisms for coordinating the movement of the driving and driven members.
- Graphical and analytical synthesis of mechanisms. Synthesis of mechanisms with two, three and more default positions.
- Graphical and analytical analysis of the position, speed and acceleration of mechanisms.
- Kinematic analysis of curve mechanisms. Ridge profile construction. Determination of speeds and accelerations and the minimum ridge radius.
- Gear mechanisms with fixed edges. Epicyclic and differential transmissions.
- Kinetostatic analysis of planar mechanisms.
- Dynamic analysis of plane mechanisms.

- Balancing plane mechanisms.
- Kinematic and dynamic analysis of the motor mechanism. Balancing of multi-cylinder engine mechanisms.
- Dynamic analysis of curve mechanisms.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ distance learning	☒ individual exercises ☐ multimedia and network ☐ laboratory ☐ mentoring work ☐ other _____

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations.

Creating an independent task with its presentation.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Written verification 1	Written verification 2	Exercise / presentation	Min	Max
LO1	1%	5%	-	-	3%	6%
LO2	4%	20%	15%	15%	27%	54%
LO3	2%	5%	-	15%	11%	22%
LO4	2%	-	10%	-	6%	12%
LO5	1%	-	5%	-	3%	6%
Share in ECTS	0.5	1.5	1.5	1.5	-	5
Total	10%	30%	30%	30%	50%	100%

Final Exam:

Learning outcome	Exercise / presentation	Oral Exam	Min	Max
LO1	-	8%	4%	8%
LO2	15%	33%	24%	48%
LO3	15%	11%	13%	26%
LO4	-	10%	5%	10%
LO5	-	8%	4%	8%
Share in ECTS	1.5	3.5	-	5
Total	30%	70%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
The results that the student does not pass during the continuous assessment, will be taken during the examination period.

The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E
60,00-74,99	good (3)	C
75,00-89,99	very good (4)	B
90,00-100,00	excellent (5)	A

1.8. Obligatory literature

1. Materijals from Merlin e – learning system
2. Norton, R.L. (2004). Design of Machinery - An Introduction to the Synthesis and Analysis of Mechanisms and Machines – McGraw Hill Education, 3rd Edition

1.9. Additional literature

1. Kumar Mallik, A., Ghosh, A., Dittrich, G. (1994). Kinematic Analysis and Synthesis of Mechanisms, CRC Press.
2. Krpan, M., Butković, M., Franulović, A, Žigulić, R., Braut, S. (2001.. Dinamika – Teorija i primjena, Sveučilište u Rijeci – Tehnički fakultet, Rijeka

1.10. Quality monitoring method

Teaching evaluations; student survey.

Istarsko veleučilište
Università Istriana
di scienze applicate

Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Power Electrical Engineering**	
Course status	Mandatory	
Year	2.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	6
	Number of hours in the semester (L+E+S)	30+45+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

Understanding the basic concepts and operating principles of electrical machines and transformers. Ability to determine steady-state characteristics using mathematical models and equivalent circuits.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Analyze the energy requirements in mechatronics.
2. Differentiate solutions for the generation, conversion, and application of electrical energy.
3. Evaluate the properties of energy sources and the need for conversion.
4. Distinguish between different designs of motors and generators.
5. Determine the need for converting available electrical energy according to the specified requirements.
6. Compare the solutions of electronic rectifiers based on the criterion of meeting the requirements.

1.4. Course content

1. Primary, transitional, and applied forms of energy.
2. Electrical energy: sources, transmission, distribution, and wiring. Standardized three-phase system.
3. Power and energy in three-phase and single-phase systems; Requirements and implementations of equipment and personnel protection.
4. Voltage transformations; Magnetic and electric circuits of single-phase and three-phase transformers.
5. Transformer properties, transmission ratio, losses, internal impedance.
6. Conversion of primary energy forms into electrical energy, generators, conversion laws, losses, efficiency.
7. Motors - conversion of electrical energy into mechanical energy, input quantities, output quantities.
8. Direct current machine - generator, motor, control of output quantities.
9. Motor for alternating current systems, rotating magnetic field, torque generation.
10. Induction motor - application properties, speed control.
11. Synchronous machine - properties and designs.
12. Electronic power rectifiers - classification, components.
13. Rectifiers - uncontrolled and controlled, designs and properties.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ distance learning	☐ individual exercises ☐ multimedia and network ☐ laboratory ☐ mentoring work ☐ other _____

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Written verification 1	Written verification 2	Min	Max
LO1	2%	14%	-	8%	16%
LO2	4%	14%	-	9%	18%
LO3	4%	12%	-	8%	16%
LO4	4%	-	14%	9%	18%
LO5	2%	-	14%	8%	16%
LO6	4%	-	12%	8%	16%
Share in ECTS	1.2	2.4	2.4	-	6
Total	20%	40%	40%	50%	100%

Final Exam:

Learning outcome	Written Exam	Min	Max
LO1	16%	8%	16%
LO2	18%	9%	18%
LO3	16%	8%	16%
LO4	18%	9%	18%
LO5	16%	8%	16%
LO6	16%	8%	16%
Share in ECTS	6	-	6
Total	100%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
The results that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade

0,00-49,99	insufficient (1)	FX, F	
50,00-59,99	sufficient (2)	D, E	
60,00-74,99	good (3)	C	
75,00-89,99	very good (4)	B	
90,00-100,00	excellent (5)	A	

1.8. Obligatory literature

1. Pinter, V. (1994). Osnove elektrotehnike II. Zagreb: Tehnička knjiga
2. Wolf, R. (1991). Osnove električnih strojeva. Zagreb: Školska knjiga
3. Materials available in the Merlin e-learning system

1.9. Additional literature

1. Inženjerski priručnik I, Školska knjiga, 1996.
2. G.R. Slemon: Electric Machines and drives: Addison –Wesley , 1992.
3. N. Mohan: Electric Drives, MNPERE, 2003.

1.10. Quality monitoring method

Teaching evaluations; student survey.

Istarsko veleučilište
Università Istriana
di scienze applicate

Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Automatic Control**	
Course status	Mandatory	
Year	2.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	5
	Number of hours in the semester (L+E+S)	30+30+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

Understanding the structure of automatic control systems, describing system characteristics and modeling methods, and determining the stability of linear continuous and discrete systems.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Draw a block diagram of a typical control system, distinguish the functions of individual blocks in the control system, and perform basic transformations between blocks.
2. Describe the mathematical model of dynamic systems.
3. Analyze the control system in the complex variable domain and frequency domain.
4. Estimate overshot and maximum response time from the phase margin and average frequency.
5. Draw the Bode plot of frequency characteristics of typical automation elements.

1.4. Course content

1. Categorization of automatic control systems.
2. Static and dynamic characteristics of automatic control system elements.
3. Description of dynamic systems by mathematical model.
4. Modeling of automatic control system elements.
5. Transfer functions and frequency characteristics of elements.
6. Using Matlab software to determine response and frequency characteristics.
7. Stability of automatic control systems.
8. Bode plot representation of frequency characteristics.
9. Determining the control quality of continuous systems.
10. Synthesis of continuous control systems using frequency methods.
11. Calculation of PID controller parameters.
12. Digital control systems.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises	☒ individual exercises ☐ multimedia and network ☒ laboratory

	☒ distance learning	☐ mentoring work ☐ other _____

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Written verification 1	Written verification 2	Laboratory exercises	Min	Max
LO1	8%	8%	-	6%	11%	22%
LO2	7%	10%	-	5%	11%	22%
LO3	6%	4%	6%	-	8%	16%
LO4	5%	-	8%	7%	10%	20%
LO5	6%	-	8%	6%	10%	20%
Share in ECTS	1.6	1.1	1.1	1.2	-	5
Total	32%	22%	22%	24%	50%	100%

Final Exam:

Learning outcome	Written Exam	Min	Max
LO1	20%	10%	20%
LO2	20%	10%	20%
LO3	20%	10%	20%
LO4	20%	10%	20%
LO5	20%	10%	20%
Share in ECTS	5	-	5
Total	100%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
The results that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E
60,00-74,99	good (3)	C
75,00-89,99	very good (4)	B
90,00-100,00	excellent (5)	A

1.8. Obligatory literature

1. Literature from e-learning
2. Petrić, J.: Automatska regulacija: uvod u analizu i sintezu, Fakultet strojarstva i brodogradnje, Sveučilište u Zagrebu, Zagreb, 2012.
3. Gregov, G.: Pneumatsko upravljanje, skripta za vježbe, Rijeka, 2019.

1.9. Additional literature

1. Šurina, T.: Automatska regulacija, Školska knjiga, Zagreb, 1991.
2. Vukić, Z., Kuljača Lj.: Automatsko upravljanje – analiza linearnih sustava, Kigen, Zagreb, 2005

1.10. Quality monitoring method

Teaching evaluations; student survey.

Istarsko veleučilište
Università Istriana
di scienze applicate

Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Business English Language in Mechatronics**	
Course status	Mandatory	
Year	2.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	4
	Number of hours in the semester (L+E+S)	30+30+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

The goal of the course is to continue working on developing basic language skills, as a continuation of the material covered in the previous semester and in accordance with the goals achieved. The intention is to continue to pay attention to the most important parts of English grammar and enable students to improve oral and written communication within the profession, taking into account the interdisciplinary nature of the profession. Since by studying mechatronics the student acquires the competence of basic engineering knowledge from various disciplines, such as mechanical engineering, industrial electronics and applied informatics, the goal of the course is to provide an integrated acquisition of knowledge that provides participants with basic information about various work tasks in this field in English.
The aim of the course is also to prepare and train students for oral and written business communication.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Present specific topics from the professional field
2. Write a summary of a specific text from the profession
3. Learn forms of formal correspondence
4. Construct various formal documents
5. Form a formal offer in business English
6. Combine expressions used in business communication (oral and written)
7. Improve professional vocabulary

1.4. Course content

Lecture content:

1. Analysis of various professional texts in English
2. Occupations and titles in the field of mechatronics and informatics
3. Job description in mechatronics and IT professions
4. Introduction to writing formal documents in business English
5. Different forms of formal communication
6. Formal offer

Content of exercises:

1. Research and development; vocabulary exercises
2. Research and development; grammatical forms
3. Technical development; practicing grammatical structures
4. Introduction of thematic units: Recruitment, Financing, Marketing

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☒ distance learning	☒ individual exercises ☐ multimedia and network ☒ laboratory ☐ mentoring work ☐ other _____

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Written verification 1	Written verification 2	Formal offer	Min	Max
LO1	1%	10%	-	-	5%	11%
LO2	1%	15%	-	-	8%	16%
LO3	1%	-	10%	-	6%	11%
LO4	2%	-	-	20%	11%	22%
LO5	2%	-	-	20%	11%	22%
LO6	1%	-	15%	-	8%	16%
LO7	2%	-	-	-	1%	2%
Share in ECTS	0.4	1	1	1.6	-	4
Total	10%	25%	25%	40%	50%	100%

Final Exam:

Learning outcome	Formal offer	Oral Exam	Min	Max
LO1	-	12%	6%	12%
LO2	-	12%	6%	12%
LO3	-	12%	6%	12%
LO4	20%	-	10%	20%
LO5	20%	-	10%	20%
LO6	-	12%	6%	12%
LO7	-	12%	6%	12%
Share in ECTS	1.6	2.4	-4	
Total	40%	60%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.

The results that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E
60,00-74,99	good (3)	C
75,00-89,99	very good (4)	B
90,00-100,00	excellent (5)	A

1.8. Obligatory literature

1. Materials and exercises posted on the Merlin e-learning platform
2. Selected chapters from additional literature

1.9. Additional literature

1. Bishop, R. H. (2002). The Mechatronics Handbook. Boca Raton: CRC Press.
2. Lannon, J.M., Gurak, L.J. (2015). Technical Communication: Pearson Education Limited
3. Lannon, J.M., Gurak, L.J. (2007). A Concise Guide to Technical Communication: Pearson Education Limited
4. Hybels, S., Weaver II, R.L. (2012). Communicating Effectively: The McGraw-Hill Companies Inc.
5. Powel, D., Walker E. (2008). Grammar Practice for Upper Intermediate Students with key: Pearson Education Limited
6. Swan, M. (2016). Practical English Usage: Oxford University Press.
7. Solórzano, H., Frazier, L. (2009). Contemporary Topics 1: Intermediate Academic Listening and Note-Taking Skills: Pearson Education Limited
8. Sahanaya, W., Lindeck, J., Stewart, R. (2012). Preparation and Practice: Reading and Writing. Academic Module: Oxford University Press, ANZ English
9. Oshima, A., Hogue, A. (2006). Writing Academic English: Pearson Longman
10. Riordan, Daniel G. (2014) Technical Report Writing Today, Cengage Learning.

1.10. Quality monitoring method

Teaching evaluations; student survey.

Istarsko veleučilište
Università Istriana
di scienze applicate

Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Pneumatics and Hydraulics**	
Course status	Mandatory	
Year	2.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	6
	Number of hours in the semester (L+E+S)	30+45+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

Application of knowledge and skills in the calculation, analysis, and design of pneumatic and hydraulic systems. Application of knowledge to the construction and assembly of pneumatic and hydraulic systems and the simulation of their operation using commercial software and didactic laboratory equipment.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Explain the concept, classification, and application of pneumatic and hydraulic systems.
2. Analyze the operating principles of hydrostatic machines.
3. Analyze the calculations of hydraulic systems.
4. Explain the operating principles of pneumatic and hydraulic control devices.
5. Explain the methods of production and preparation of compressed air.
6. Analyze pneumatic control systems.

1.4. Course content

1. Operating principles, advantages, disadvantages, and applications of hydraulic systems.
2. Physical foundations of hydraulics.
3. Working fluid.
4. Hydrostatic machines for power transmission.
5. Hydraulic control devices.
6. Proportional and servo control devices.
7. Pipes, pipe fittings, and sealing in hydrostatic systems.
8. Hydraulic devices for conditioning.
9. Operating principles, advantages, disadvantages, and applications of pneumatic systems.
10. Production and preparation of compressed air.
11. Pneumatic actuators and auxiliary pneumatic devices.
12. Pneumatic and electro-pneumatic control systems.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops	☒ individual exercises ☐ multimedia and network

	☒ exercises ☒ distance learning	☒ laboratory ☐ mentoring work ☐ other _____

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Written verification 1	Written verification 2	Laboratory exercises	Min	Max
LO1	6%	8%	-	-	7%	14%
LO2	6%	10%	-	-	8%	16%
LO3	20%	-	-	-	10%	20%
LO4	4%	5%	5%	-	7%	14%
LO5	4%	-	12%	-	8%	16%
LO6	10%	-	-	10%	10%	20%
Share in ECTS	2.5	1.15	0.85	0.5	-	5
Total	50%	23%	17%	10%	50%	100%

Final Exam:

Learning outcome	Written Exam	Min	Max
LO1	14%	7%	14%
LO2	16%	8%	16%
LO3	20%	10%	20%
LO4	14%	7%	14%
LO5	16%	8%	16%
LO6	20%	10%	20%
Share in ECTS	1	-	1
Total	100%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
The results that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E
60,00-74,99	good (3)	C

75,00-89,99	very good (4)	B
90,00-100,00	excellent (5)	A

1.8. Obligatory literature

1. Siminiati, D.: Uljna hidraulika, Tehnički fakultet Sveučilišta u Rijeci, Rijeka, 2012.
2. Gregov, G.: Pneumatsko upravljanje, skripta za vježbe, Rijeka, 2019.
3. Nikolić, G.: Pneumatika i elektro-pneumatika, Tehničko veleučilište u Zagrebu, Zagreb. 2007.

1.9. Additional literature

1. Petrić, J.: Hidraulika, Fakultet strojarstva i brodogradnje Sveučilišta u Zagrebu, Zagreb, 2012.
2. Korbar, R.: Pneumatika i hidraulika, Veleučilište u Karlovcu, Karlovac, 2007.

1.10. Quality monitoring method

Teaching evaluations; student survey.

Istarsko veleučilište
Università Istriana
di scienze applicate

Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Structure and Properties of Technical Materials**	
Course status	Elective	
Year	1.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	4
	Number of hours in the semester (L+E+S)	45+15+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

Developing a comprehensive understanding of material science for effective selection, application, and modification of technical material properties. Understanding and analyzing the relationship between microstructure and the properties of engineering materials. Learning and applying fundamental principles of material characterization to address and resolve production challenges.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Relate the concept of structure to the properties of materials
2. Relate the physico-chemical basis to the properties of individual technical materials.
3. Elaborate on the principles of modifying technical materials by manipulating microstructure.
4. Propose methods for material characterization.
5. Determine the environmental impact of the material lifecycle.

1.4. Course content

1. Physico-chemical concepts of (micro)structure of materials – substance composition and chemical bonding.
2. Solid-state structure – crystallography, defects, and diffusion.
3. Microstructure and properties of polymers, ceramics, and composites.
4. Physico-chemical foundations and relationships between microstructure and selected (mechanical, electrical, magnetic, optical, and thermal) properties of materials.
5. Phase transformations in physico-chemical systems, phase diagrams, and the microstructure.
6. Material property testing – sampling methods and selection principles for various analytical techniques.
7. Material lifecycle and their environmental impact – metal corrosion and its prevention, degradation of non-metallic materials.

1.5. Teaching methods	☒ lectures ☒ seminars and workshops ☒ exercises ☒ distance learning	☐ individual exercises ☐ multimedia and network ☐ laboratory ☐ mentoring work

		☐ other _____

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations.

Students should regularly attend and actively participate in lectures and exercises. Attendance is mandatory for at least 70% of the total hours, which is essential for successful learning and engagement. After completing the first instructional unit (approximately half of the course material), students must take a midterm exam in the form of a written test. The results will significantly contribute to the final grade evaluation.

Students must independently prepare and defend seminar papers by the end of the semester. Topics are chosen from several provided options. Papers must be submitted in written form and presented orally, following specified guidelines on length, format, and presentation criteria.

Students who have fulfilled the above obligations can take the final exam, consisting of written (problem-solving) and oral components. The final exam will be graded according to a detailed breakdown of the grading criteria below.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Written verification 1	Written verification 2	Seminar paper and presentation	Min	Max
LO1	3%	10%		7%	10%	20%
LO2	3%	10%		7%	10%	20%
LO3	3%	10%		7%	10%	20%
LO4	3%		10%	7%	10%	20%
LO5	3%		10%	7%	10%	20%
Share in ECTS	0.6	1.2	0.8	1.4	-	4
Total	15%	30%	20%	35%	50%	100%

Final Exam:

Learning outcome	seminar paper and presentation	Written Exam	Min	Max
LO1	7%	13%	10%	20%
LO2	7%	13%	10%	20%
LO3	7%	13%	10%	20%
LO4	7%	13%	10%	20%
LO5	7%	13%	10%	20%
Share in ECTS	1.4	2.6	-	4
Total	35%	65%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
The results that the student does not pass during the continuous assessment, will be taken during the examination period.

The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E
60,00-74,99	good (3)	C
75,00-89,99	very good (4)	B
90,00-100,00	excellent (5)	A

1.8. Obligatory literature

1. Callister, W.D., Rethwisch, D.G. - Materials science and engineering - an introduction, Wiley, Hoboken, USA , 2018.
2. Matković T., Matković P., Slokar Lj. Znanost o metalima – zbirka rješenih zadataka. Sveučilište u Zagrebu, Metalurški fakultet, Sisak, 2010. (available online)
3. Pucić, I. Lecture presentations

1.9. Additional literature

1. Kolumbić Z., Dunđer, M. Materijali. Alfa d.d./Filozofski fakultet Rijeka, Rijeka, 2011.

1.10. Quality monitoring method

Teaching evaluations; student survey.

Istarsko veleučilište
Università Istriana
di scienze applicate

Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Elements of Automation**	
Course status	Mandatory	
Year	2.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	5
	Number of hours in the semester (L+E+S)	30+30+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

The aim of the course is to acquire fundamental insights into control theory, specifically gaining knowledge about the basic elements and concepts of control systems. It establishes a foundation for further knowledge enhancement aimed at analyzing and synthesizing automatic control systems and prepares students to make essential financial and/or technical decisions during the implementation of such systems.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Differentiate automatic control systems based on their structure and operating principles.
2. Determine the basic properties of automatic control systems.
3. Identify basic subsystems and signals.
4. Identify mathematical models of simple systems.
5. Analyze and compare mathematical models of equivalent systems in nature.
6. Determine the transfer function of dynamic systems.
7. Apply operational calculus (Laplace transform) to solve linear differential equations with constant coefficients.
8. Determine the transfer function of a dynamic system.
9. Determine the amplitude-frequency and phase-frequency characteristics of a dynamic system.
10. Differentiate and describe basic implementations of control loop components.
11. Determine and justify the stability, accuracy, and dynamic properties of automatic control systems.

1.4. Course content

1. Introduction: Application of regulation in engineering, control, regulation.
2. Mathematical approach to dynamic systems: Mathematical models of systems, linearization.
3. Time-domain analysis: Standard input functions, time response of systems.
4. Complex variable analysis: Laplace transform, transfer function.
5. Frequency-domain analysis: Sinusoidal transfer function, graphical representation of sinusoidal transfer function, frequency response of basic systems.
6. Control objects: Process control possibilities, paths with and without compensation.
7. Control devices: Behavior of control devices, measuring elements, control elements, executive elements.
8. Analysis of control loop: Control performance, regulation accuracy, stability of regulation.

9. Application of Matlab software package: Control System Toolbox, Simulink.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☒ distance learning	☒ individual exercises ☐ multimedia and network ☐ laboratory ☐ mentoring work ☐ other _____

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Homework	Individual assignments	Min	Max
LO1	2%	-	1%	2%
LO2	3%	10%	6.5%	13%
LO3	5%	-	2.5%	5
LO4	5%	10%	7.5%	15%
LO5	5%	-	2.5%	5%
LO6	5%	-	2.5%	5%
LO7	5%	-	2.5%	5%
LO8	5%	-	2.5%	5%
LO9	5%	-	2.5%	5%
LO10	5%	10%	7.5%	15%
LO11	5%	10%	7.5%	15%
Share in ECTS	2.5	2.5	-	5
Total	50%	50%	50%	100%

Final Exam:

Learning outcome	Oral Examination	Min	Max
LO1	2%	1%	2%
LO2	13%	6.5%	13%
LO3	5%	2.5%	5%
LO4	15%	7.5%	15%
LO5	15%	7.5%	15%
LO6	5%	2.5%	5%
LO7	5%	2.5%	5%
LO8	5%	2.5%	5%
LO9	5%	2.5%	5%
LO10	15%	7.5%	15%
LO11	15%	7.5%	15%
Share in ECTS	5	-	5

Total	100%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
The results that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E
60,00-74,99	good (3)	C
75,00-89,99	very good (4)	B
90,00-100,00	excellent (5)	A

1.8. Obligatory literature

1. Šurina T.(1974).Analiza i sinteza servomehanizma i procesne regulacije. Zagreb: Školska knjiga. 2. Vukić,Z. i Kuljača, LJ.(2005).Automatsko upravljanje - analiza linearnih sustava
2. Kuljača Lj., Vukić Z.. (1985).Automatsko upravljanje sistemima.Zagreb: Školska knjiga.
3. Novaković B.. (1990). Metode vođenja tehničkih sistema. Zagreb: Školska knjiga
4. Šurina T.(1990). Industrijski roboti. Zagreb: Školska knjiga
5. L.A. Bryan, E.A. Bryan (1997).Programmable Controllers: Theory and Implementation" Second Edition, Industrial Text Co

1.9. Additional literature

1. D'Azzo, J.J., Houpis, C.H.(1995).Linear Control System Analysis and Design - Conventional and Modern. NY: McGraw Hill
2. Gene F. Franklin, J. David Powell, and Abbas Emami-Naeini (2006).Feedback Control of Dynamic Systems", Fifth Edition,. NY:Pearson Education, Inc., Upper Saddle River

1.10. Quality monitoring method

Teaching evaluations; student survey.

Istarsko veleučilište
Università Istriana
di scienze applicate

Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Processing Computers**	
Course status	Mandatory	
Year	2.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	6
	Number of hours in the semester (L+E+S)	30+45+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

Introduce students to the tasks of managing a complex manufacturing process and explain the implementation of an automatic process control system, from interfacing with the technical process to control system implementation and overall process and production monitoring.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Differentiate real-time computer systems from others.
2. Link system elements with software support.
3. Develop control logic based on graphical programming languages.
4. Construct flowcharts for programming control algorithms.
5. Utilize programming tools for PLC programming.
6. Develop control programs for simple systems.
7. Establish the connection between software support, computers, and end-system elements.

1.4. Course content

1. Computer-controlled systems for real-time operation.
2. Basic elements of PLC devices.
3. Interaction with the environment and control of inputs and outputs of PLC devices.
4. Programmable logic controller as the main part of the control system.
5. Processes and management.
6. Connection of the process with the circuit of the PLC computer and presentation of the way of addressing external units.
7. Basics of PLC programming.
8. Advanced PLC programming.
9. Creation of project documentation of program support.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☒ distance learning	☒ individual exercises ☒ multimedia and network ☒ laboratory ☒ mentoring work

		☐ other _____

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Project Assignment	Oral Examination	Min	Max
LO1	4%	-	5%	4.5%	9%
LO2	4%	8%	5%	8.5%	17%
LO3	5%	9%	5%	9.5%	19%
LO4	4%	8%	5%	8.5%	17%
LO5	5%	9%	-	7%	14%
LO6	5%	8%	-	6.5%	13%
LO7	3%	8%	-	5.5%	11%
Share in ECTS	1.8	3	1.2	-	6
Total	30%	50%	20%	50%	100%

Final Exam:

Learning outcome	Project Assignment	Oral Examination	Min	Max
LO1	-	9%	4.5%	9%
LO2	8%	9%	8.5%	17%
LO3	9%	10%	9.5%	19%
LO4	8%	9%	8.5%	17%
LO5	9%	5%	7%	14%
LO6	8%	5%	6.5%	13%
LO7	8%	3%	5.5%	11%
Share in ECTS	3	3	-	6
Total	50%	50%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
The results that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E
60,00-74,99	good (3)	C
75,00-89,99	very good (4)	B

90,00-100,00	excellent (5)	A

1.8. Obligatory literature

1. Smiljanić, G. (1991). Računala i procesi. Zagreb: Školska knjiga
2. Smiljanić, G. (1990). Mikroračunala.Zagreb: Školska knjiga
3. Materials available on the e-learning platform

1.9. Additional literature

1. Hugh J.(2010). Automating manufacturing systems with PLCs, 7th edition, Lulu.com
2. Borded, T.i Cox, R. (2013). Technician's Guide to Programmable Controllers 6th edition, Delmar
3. Bolton, W. (2015). Programmable Logic Controllers, 6th edition, Elsevier

1.10. Quality monitoring method

Teaching evaluations; student survey.

Istarsko veleučilište
Università Istriana
di scienze applicate

Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Communication Techniques in Mechatronics**	
Course status	Mandatory	
Year	3.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	4
	Number of hours in the semester (L+E+S)	30+15+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

After listening to and passing the course, students are trained to apply knowledge and skills that enable the correct selection and application of communication technology in mechatronic systems.

The subject acquires competencies applicable in the preparation of semester work and professional practice, as well as application in other subjects of the undergraduate professional study of mechatronics that include the application of communication technology.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Analyze and classify information and messages in management systems.
2. Analyze industrial communication and information systems.
3. Choose appropriate laboratory equipment for the analysis of communication systems.
4. Design the implementation of communication protocols in mechatronic systems.
5. Recommend a mechatronic system with an appropriate communication subsystem.

1.4. Course content

Introduction. Description of mechatronic systems with communication subsystem. Designing and general features of communication systems. AD and DA conversion, analogic communication. Adjustment of analogic signals for transmission, signal filtering. Digital communication, parallel data transfer. Serial communication protocols, synchronous communication protocols, SPI I2C. Asynchronous serial protocols, UART and CAN protocol. Industrial communication protocols. TCP/IP and Ethernet. Wireless communication protocols. Communications in the context of IoT.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ distance learning	☒ individual exercises ☐ multimedia and network ☒ laboratory ☒ mentoring work ☐ other _____

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Written verification 1	Written verification 2	Laboratory exercises	Min	Max
LO1	-	10%	-	-	5%	10%
LO2	-	-	20%	-	10%	20%
LO3	5%	-	-	6%	5.5%	11%
LO4	-	20%	-	6%	13%	26%
LO5	5%	-	20%	8%	16.5%	33%
Share in ECTS	0.2	1.2	1.6	1	-	4
Total	10%	30%	40%	20%	50%	100%

Final Exam:

Learning outcome	Written Exam	Min	Max
LO1	15%	7,5%	15%
LO2	25%	12.5%	25%
LO3	-	-	-
LO4	30%	15%	30%
LO5	30%	15%	30%
Share in ECTS	4	-	4
Total	100%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
The results that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E
60,00-74,99	good (3)	C
75,00-89,99	very good (4)	B
90,00-100,00	excellent (5)	A

1.8. Obligatory literature

1. Grbac Babić S.: Presentations from lectures and exercises and other teaching materials - available online through the Merlin e-learning system
2. W. Bolton. Mechatronics. Electronic Control systems in Mechanical and Electrical Engineering (6 rd Edition), ISBN 0 131 21633 3

1.9. Additional literature
1. R. Toulson, T. Wilmshurst. Fast and Effective Embedded System Design, 1.st Edition – Applying the ARM mbed 2. Manufacturer's catalogues materials and Data Sheets
1.10. Quality monitoring method
Teaching evaluations; student survey.

Istarsko veleučilište
Università Istriana
di scienze applicate

Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Computer Networks**	
Course status	Elective	
Year	3.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	4
	Number of hours in the semester (L+E+S)	30+30+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

After listening to and passing the course, students are trained to apply the knowledge and skills they enable proper selection and application of computer networks in mechatronic systems.
The subject acquires competencies applicable in the preparation of semester work and professional practice, as well as application in
other courses in the undergraduate professional study of mechatronics that include the application of communication technology.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Describe basic concepts and terms in computer networks
2. Distinguish the purpose of different network devices and explain the procedure for connecting multiple computers to a network
3. Describe and explain the operation of the network layer
4. Describe and explain the operation of the transport layer protocol
5. List and describe the operation of the most important protocols of the application layer

1.4. Course content

1. Introduction to computer networks (LO1)
2. History. Organization of computer networks. Parameters and classifications of networks according to various criteria. Network standards.
3. Network architectures: OSI model and TCP/IP model (LO1) Architecture and concept of computer networks. ISO/OSI standard. TCP/IP architecture.
4. Connecting the local network to the Internet. Access technologies. (LO1)
5. Physical and data layer (LO2)
6. Portable media (wired and wireless). Signal modulation. Local computer networks (LAN – Ethernet / IEEE 802.3). MAC address. Ethernet frame structure. Connecting local networks.
7. Network layer (LO3)
8. Network layer protocols. IP protocol (IPv4). IP address. Addressing in the network. IP packet structure. IP fragmentation. Network routing. IP protocol IPV6. Comparison of IPV4 and IPV6.
9. Transmission layer (LO4) TCP protocol. TCP connection establishment and termination. UDP protocol. Flow management.

10. Session layer and presentation layer (LO5)
11. Application layer (LO5) Display of application layer protocols: HTTP, FTP, Telnet, SMTP. DNS system.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ distance learning	☐ individual exercises ☐ multimedia and network ☐ laboratory ☒ mentoring work ☐ other _____

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Written verification 1	Written verification 2	Laboratory exercises	Min	Max
LO1	2%	18%	-	2%	11%	22%
LO2	2%	22%	-	2%	13%	26%
LO3	1%	-	15%	2%	9%	18%
LO4	2%	-	10%	2%	7%	14%
LO5	3%	-	15%	2%	10%	20%
Share in ECTS	0.4	1.6	1.6	0.4	-	4
Total	10%	40%	40%	10%	50%	100%

Final Exam:

Learning outcome	Written Exam	Min	Max
LO1	20%	10%	20%
LO2	26%	13%	26%
LO3	20%	10%	20%
LO4	14%	7%	14%
LO5	20%	10%	20%
Share in ECTS	4	-	4
Total	100%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
The results that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E
60,00-74,99	good (3)	C
75,00-89,99	very good (4)	B
90,00-100,00	excellent (5)	A

1.8. Obligatory literature

1. Tanenbaum,A.S. & Wetherall, D.J. (2011). Computer Networks, 5th Ed., Prentice Hall (available online)

1.9. Additional literature

2. Bažant. A. i sur.(2014). Basics of network architecture. Zagreb: Element

1.10. Quality monitoring method

Teaching evaluations; student survey.

Istarsko veleučilište
Università Istriana
di scienze applicate

Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Electrical Drives**	
Course status	Mandatory	
Year	3.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	5
	Number of hours in the semester (L+E+S)	30+30+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

Acquiring fundamental knowledge about electrical drives and familiarization with modulation and regulation using frequency converters.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Differentiate the concepts of control, regulation of an electric drive,
2. Differentiate between types of electric motor drives and power supply methods,
3. Calculate the parameters of direct current and alternating current electric drive,
4. Calculate the parameters of the braking resistor for the electric drive system,
5. Understand the principles of inverter and frequency converter,
6. Parameterize the control logic for Brushless motors,
7. Analyze, simulate and demonstrate the operation of an electric motor drive in mechatronics

1.4. Course content

1. Introduction to electric drives,
2. Classification and basic features of electric drives,
3. Operating points of the drive and practical applicability of the drive,
4. DC drives and AC motor regulation,
5. AC drives and converters in mechatronics,
6. Asynchronous motors and frequency converters,
7. Dynamic characteristics of the DC electric motor drive,
8. Brake resistors and drive stop mechanisms,
9. Simulation and demonstration of DC motor operation,
10. Simulation and demonstration of asynchronous motor operation,
11. Simulation and demonstration of stepper motor operation.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ distance learning	☐ individual exercises ☐ multimedia and network ☒ laboratory ☐ mentoring work

		☐ other _____

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Written verification 1	Written verification 2	Min	Max
LO1	5%	-	-	2.5%	5%
LO2	-	30%	-	15%	30%
LO3	-	-	30%	15%	30%
LO4	20%	-	-	10%	20%
LO5	5%	-	-	2.5%	5%
LO6	5%	-	-	2.5%	5%
LO7	5%	-	-	2.5%	5%
Share in ECTS	2	1.5	1.5	-	5
Total	40%	30%	30%	50%	100%

Final Exam:

Learning outcome	Written Exam	Oral Exam	Min	Max
LO1	5%	-	2.5%	5%
LO2	20%	-	10%	20%
LO3	-	40%	20%	40%
LO4	5%	-	2.5%	5%
LO5	5%	-	2.5%	5%
LO6	10%	-	5%	10%
LO7	15%	-	7.5%	15%
Share in ECTS	3	2	-	5
Total	60%	40%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
The results that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E
60,00-74,99	good (3)	C

	75,00-89,99	very good (4)	B	
	90,00-100,00	excellent (5)	A	

1.8. Obligatory literature

1. W. Bolton. Mechatronics. Electronic Control Systems in Mechanical and Electrical Engineering (3rd Edition), ISBN 0 131 21633 3
2. Materials on the Merlin e-learning system

1.9. Additional literature

1. R. Toulson, T. Wilmshurst. Fast and Effective Embedded Systems Design, 1st Edition - Applying the ARM mbed

1.10. Quality monitoring method

Teaching evaluations; student survey.

Istarsko veleučilište
Università Istriana
di scienze applicate

Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Embedded Systems Design**	
Course status	Mandatory	
Year	3.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	5
	Number of hours in the semester (L+E+S)	30+30+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

Mastering knowledge about the use and design of embedded computer systems in mechatronics.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Identify and specify and differentiate the elements of embedded computer systems for application in mechatronics.
2. Use elements of micro-control systems for application in mechatronics.
3. Design simple functions, classes and programs in the programming language used by the microcontroller system.
4. Combine your own written classes with predefined classes for working with peripheral units of the selected microcontroller system.
5. Create project documentation for the creation of a microcontroller system for a given application.

1.4. Course content

1. Introductory lecture; General information on embedded computer systems;
2. Programming languages; Object-oriented approach to programming;
3. Writing simple programs; Use of functions and classes;
4. Processors in embedded computer systems; Memory architectures in embedded computer systems;
5. Input-output circuit units (A/D, D/A, PWM, GPIO, serial and parallel interfaces, buses);
6. Input-output circuit units (Configuring and examples of read and write operations);
7. Interrupts, exceptions, timers, counters, interrupt management; Software support for selected microcontroller - Part 1;
8. Interrupts, exceptions, timers, counters, interrupt management; Software support for the selected microcontroller - Part 2;
9. Example analysis;
10. Preparation of project documentation for the creation of a micro-controller system for a given application;

1.5. Teaching methods	☒ lectures ☐ seminars and workshops	☒ individual exercises ☒ multimedia and network

	☒ exercises ☐ distance learning	☒ laboratory ☐ mentoring work ☒ other project assignment

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity - practical tasks	Project assignment	Min	Max
LO1	12%	8%	10%	20%
LO2	12%	12%	12%	24%
LO3	13%	10%	11.5%	23%
LO4	13%	-	6.5%	13%
LO5	-	20%	10%	20%
Share in ECTS	2.5	2.5	-	5
Total	50%	50%	50%	100%

Final Exam:

Learning outcome	Project assignment	Oral exam	Min	Max
LO1	8%	12%	10%	20%
LO2	12%	12%	12%	24%
LO3	10%	13%	11,5%	33%
LO4	-	13%	6.5%	13%
LO5	20%	-	10%	20%
Share in ECTS	2.5	2.5	-	5
Total	50%	50%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
Learning outcome that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E
60,00-74,99	good (3)	C
75,00-89,99	very good (4)	B
90,00-100,00	excellent (5)	A

1.8. Obligatory literature
1. Budin, L. (2001). Mikroračunala i mikroupravljači. Zagreb: Element
1.9. Additional literature
1. Purdum, J. (2015). Beginning C for Arduino: Learn C Programming for the Arduino, 2nd edition. Apress. 3. 2. Šribar,J., Motik, B. (2010). Demistificirani C++, 2. prošireno izdanje. Zagreb: Element
1.10. Quality monitoring method
Teaching evaluations; student survey.

Istarsko veleučilište
Università Istriana di scienze applicate

Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Leadership Skills**	
Course status	Elective	
Year	3.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	4
	Number of hours in the semester (L+E+S)	30+30+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

Acquiring students' knowledge of the key aspects of modern management and leadership, which represent the basic assumption of successful management of organizations, and the acquisition of basic theoretical and practical knowledge in the field of leadership so that students develop and improve their own leadership ability in order to successfully apply individual knowledge and skills in practical business situations.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Describe and explain the principles of creating and leading successful teams;
2. Recognize and evaluate correct and incorrect procedures (errors) that occur in the process of leadership and management and appropriate actions in case of detected errors, as well as how to avoid typical errors;
3. Apply models of presentation, leadership, motivation and decision-making in everyday business situations.

1.4. Course content

1. Characteristics of leadership, personal and behavioral characteristics, comparison of managers and leaders.
2. Leadership styles and how to apply them in practice.
3. Key competencies and communication skills in modern management.
4. Mistakes in management and how to avoid them in practice.
5. Creating and leading successful teams.
6. Ethics of contemporary business leaders.
7. Emotional and social intelligence of the leader.
8. Development of own management style and continuous improvement.
9. Leadership styles and reward matrix.
10. 10. Power as a factor of leadership and its influence on others (use of power, sources of power in leadership, analysis of power, use of the power of personality and the power of knowledge).

1.5. Teaching methods	☒ lectures ☐ seminars and workshops	☒ individual exercises ☒ multimedia and network

	☒ exercises ☒ distance learning	☐ mentoring work ☐ other _____

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity / Independent tasks	Research assignment and presentation	Min	Max
LO1	5%	10%	7.5%	15%
LO2	20%	35%	27.5%	55%
LO3	10%	20%	15%	30%
Share in ECTS	1.4	2.6	-	4
Total	35%	65%	50%	100%

Final Exam:

Learning outcome	Oral Exam	Min	Max
LO1	15%	7,5%	15%
LO2	55%	27,5%	55%
LO3	30%	15%	30%
Share in ECTS	4	-	4
Total	100%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
The results that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E
60,00-74,99	good (3)	C
75,00-89,99	very good (4)	B
90,00-100,00	excellent (5)	A

1.8. Obligatory literature

1. Materials from Merlin e-learning system.

1.9. Additional literature

1. Nahavandi, A. (2003). The Art and Science of Leadership. Prentice Hall 2. Zenger, J. H.; Folkman, J. R. (2009). The extraordinary leader: Turning good managers into great leaders. New York: McGraw-Hill.
1.10. Quality monitoring method
Teaching evaluations; student survey.

Istarsko veleučilište
Università Istriana
di scienze applicate

Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	Maintenance of Technical Systems in Mechatronics	
Course status	Mandatory	
Year	3.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	4
	Number of hours in the semester (L+E+S)	30+15+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

Getting to know the maintenance procedures during the lifetime of technical systems (TS), the development of approaches, concepts and models of maintenance activities in relation to the development of TS. Strategies in maintenance of TS and mechatronic equipment and development of technological maintenance processes. Planning and quality objectives of TS maintenance, basic technologies, diagnostics, etc. in modern maintenance of mechatronic equipment.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Develop the foundations for a modern approach to maintenance.
2. Categorize technical systems by criticality.
3. Keep data on downtimes of technical systems in mechatronics.
4. Analyze data on downtimes and breakdowns of technical systems.
5. Propose technological processes of preventive and corrective maintenance.
6. Propose a strategy for maintaining technical systems in mechatronics.
7. Calculate the parameters for making a decision on replacing the old TS with a new one.

1.4. Course content

1. General terms in equipment maintenance and terminology used;
2. Development of the approach and conception of the maintenance function in relation to the development of technical systems;
3. Corrective and preventive maintenance;
4. Terotechnology, choice of maintenance strategy;
5. Logistic and planned maintenance;
6. Primary and secondary maintenance tasks;
7. Calculation of the availability and operational reliability of the equipment and the use of the results;
8. Parameters for determining the condition of the equipment and the type of diagnostics;
9. Use of different technologies in the repair of machine parts;
10. Lubrication and anti-corrosion protection;
11. Defining maintenance processes and their organizational realization in different industries branches;
12. Modern solutions of maintenance organization and trends in the world;

1.5. Teaching methods	☒ lectures ☒ seminars and workshops ☒ exercises ☒ distance learning	☒ individual exercises ☐ multimedia and network ☐ laboratory ☒ mentoring work ☐ other _____

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Homework	Task/Seminar/ Presentation	Min	Max
LO1	4 %	-	6 %	5 %	10 %
LO2	-	5 %	5 %	5 %	10 %
LO3	5 %	5 %	-	5 %	10 %
LO4	5 %	10 %	5 %	10 %	20 %
LO5	5 %	10 %	5 %	10 %	20 %
LO6	5 %	5 %	-	5 %	10 %
LO7	5 %	10 %	5 %	10 %	20 %
Share in ECTS	1.16	1.8	1.04	-	4
Total	29 %	45 %	26 %	50%	100%

Final Exam:

Learning outcome	Written Exam	Oral Exam	Min	Max
LO1	5 %	5 %	5 %	10 %
LO2	5 %	5 %	5 %	10 %
LO3	5 %	5 %	5 %	10 %
LO4	10 %	10 %	10 %	20 %
LO5	10 %	10 %	10 %	20 %
LO6	5 %	5 %	5 %	10 %
LO7	10 %	10 %	10 %	20 %
Share in ECTS	2	2	-	4
Total	50 %	50 %	50 %	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
The results that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E
60,00-74,99	good (3)	C
75,00-89,99	very good (4)	B
90,00-100,00	excellent (5)	A

1.8. Obligatory literature

1. E-learning materials (lectures and exercises)

1.9. Additional literature

1. Kondić, Ž., Čikić, A. i Kondić, V: (2014).Osnove održavanja mehatroničkih sustava 1. Bjelovar: Visoka tehnička škola u Bjelovaru
2. Robert H. Bishop, The Mechatronics Handbook

1.10. Quality monitoring method

Teaching evaluations; student survey.

Istarsko veleučilište
Università Istriana
di scienze applicate

Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Metrology and Quality Control**	
Course status	Mandatory	
Year	3.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	4
	Number of hours in the semester (L+E+S)	30+30+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

The goal of this course is to establish fundamental knowledge in the field of metrology and quality, with a special emphasis on measurements in mechatronics.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. To be able to differentiate basic metrological terms and methods.
2. To be able to determine the capability of the measurement system.
3. To be able to verify the results of comparative measurements.
4. To be able to propose tasks for aligning quality management systems with ISO 9001 guidelines.
5. To be able to design (diagram, graph, map) control charts.

1.4. Course content

1. Introduction to metrology, categories of metrology. Metrological infrastructure in Croatia.
2. Measurement systems, measurement units, measurement.
3. Measurement traceability. Standards.
4. Errors and estimation of the measurement system. Expression of measurement results and estimation of measurement uncertainty.
5. Introduction to quality management, quality definitions, development path, 8 principles of Quality Management.
6. Requirements of the ISO 9001 standard.
7. Quality control in production, Quality Management in procurement, 8D method, control charts.
8. Requirements of the ISO 14001 standard.
9. Requirements of the ISO 45001 standard.
10. Testing and calibration laboratories - requirements of the ISO 17025 standard.

1.5. Teaching methods

☒ lectures ☐ seminars and workshops ☒ exercises ☒ distance learning	☒ individual exercises ☐ multimedia and network ☒ laboratory ☐ mentoring work

		☐ other _____

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Project assignment	Laboratory exercises	Written verification	Min	Max
LO1	2%	-	-	30%	16%	32%
LO2	2%	-	10%	-	6%	12%
LO3	2%	-	10%	-	6%	12%
LO4	2%	30%	-	-	16%	32%
LO5	2%		10%	-	6%	12%
Share in ECTS	0.4	1.2	1.2	1.2	-	4
Total	10%	30%	30%	30%	50%	100%

Final Exam:

Learning outcome	Written Exam	Oral Exam	Min	Max
LO1	20	12	16%	32%
LO2	10	2	6%	12%
LO3	10	2	6%	12%
LO4	20	12	16%	32%
LO5	10	2	6%	12%
Share in ECTS	2.8	1.2	-	4
Total	70%	30%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
The results that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E
60,00-74,99	good (3)	C
75,00-89,99	very good (4)	B
90,00-100,00	excellent (5)	A

1.8. Obligatory literature

1. E-learning materials (lectures and exercises)
2. Bajzek Brezak, B., Quality to Accreditation, Accreditation to Excellence, Croatian Metrology Society, Zagreb (2018)

1.9. Additional literature

1. Brezinšćak, M., Measurement and Computation in Engineering and Science, Technical Book, Zagreb (1971)
2. Anthony, D.M., Engineering Metrology, Pergamon Press, New York (1986)
3. Juran, J.M., Quality Control Handbook, McGraw-Hill, New York (1989)

1.10. Quality monitoring method

Teaching evaluations; student survey.

Istarsko veleučilište
Università Istriana
di scienze applicate

Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Production and Project Management**	
Course status	Mandatory	
Year	3.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	4
	Number of hours in the semester (L+E+S)	30+15+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

Acquisition of basic knowledge in the organization and management of business processes with special emphasis on the types and processes of production, as an essential part of that process. The emphasis will be on modern production processes with a special focus on mechatronic systems in mechanical engineering, metalworking and electrical processing industries. Students will get to know the production process in detail from the moment when sales secure the market and create plans, and through all preparatory stages, such as designing production processes, creating norms, securing tools and devices, logistical support and finally just planning, execution and monitoring of production orders and their accounting.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Plan and manage production and separate production cycles.
2. Determine inter-operational stoppages and calculate flow coefficients and actual production cycles.
3. Construct planning tasks in a time diagram (gantogram) forward and backward.
4. Differentiate methods in material planning and inventory management.
5. Construct a time diagram or one of the network planning techniques.
6. Solve given production planning problems.

1.4. Course content

1. Introductory remarks, definition of production and its division by types, which also determine the way of planning or management.
2. Definition and processing of all theoretical production cycles and graphic representation using time diagrams (Ganttogram in advance).
3. Interoperational stoppages and production flow coefficients and their dependence on the actual production cycle.
4. Selection and application of the flow coefficient in relation to the type of production and shift work
5. Display of product assembly activities according to the assembly scheme and graphic representation using a time diagram (Gantt chart backwards).
6. Optimal order of launching work orders.
7. Management of raw materials and calculation of economic quantities, batches and stocks based on different criteria.

8. Reservation and planned distribution of raw materials in a certain company.
9. Introductory notes and reasons for the introduction of network planning techniques, especially the PERT and CPM techniques that are presented in the diagram of arrows and elaboration and presentation of drawing the diagram of arrows according to the matrix of interdependence.
10. Application of "Fulkerson's rule" for the numbering of events in the diagram of arrows and the calculation of networks in the diagram arrow according to the rules "forward-backward".
11. Presentation of network planning techniques in the time scale "Transplan" or as the Americans call it "Ganttogram" and to determine why it was necessary after mastering the projects using the network planning technique to return to the display in time scale.
12. Optimization of network planning techniques or projects and presentation of projects or planning tasks in Precedence network planning technique or PDM.
13. Rules for using PDM in project management and block card technique.
14. Presentation of one of the SW for project planning using network planning techniques.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☒ distance learning	☒ individual exercises ☒ multimedia and network ☐ laboratory ☐ mentoring work ☐ other _____

1.6. Students' obligations to take the exam

Solving project tasks in class and at home, independent study

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Project exam	Written verification 1	Min	Max
LO1	4%		10%	7%	14%
LO2	4%		10%	7%	14%
LO3	4%		10%	7%	14%
LO4	4%		10%	7%	14%
LO5	4%		10%	7%	14%
LO6		30%		15%	30%
Share in ECTS	0.8	1.2	2	-	4
Total	20%	30%	50%	50%	100%

Final Exam:

Learning outcome	Written Exam	Min	Max
LO1	14%	7%	14%
LO2	14%	7%	14%
LO3	14%	7%	14%
LO4	14%	7%	14%
LO5	14%	7%	14%
LO6	30%	15%	30%

Share in ECTS	4	-	4
Total	100%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
The results that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E
60,00-74,99	good (3)	C
75,00-89,99	very good (4)	B
90,00-100,00	excellent (5)	A

1.8. Obligatory literature

1. E-learning materials on Mernin system.
2. Čala, I.(2002). Planiranje i praćenje proizvodnje, Inženjerski priručnik IP-4 - Proizvodno strojarstvo - 3. sv. - Organizacija proizvodnje. Zagreb: Školska knjiga
3. Taboršak, D. (1984). Organizacija proizvodnje, Tehnička enciklopedija – 5. sv.. Zagreb: LZ Miroslav Krleža

1.9. Additional literature

1. Schroeder, R. G.(1999). Upravljanje proizvodnjom.Zagreb: Mate
2. Majdandžić, N., et al. (2001). Upravljanje proizvodnjom. Slavonski Brod: SFSB
3. Russell, R.S. & Taylor, B.W. (2019).Operations and Supply Chain Management. Hoboken:Wiley

1.10. Quality monitoring method

Teaching evaluations; student survey.

Istarsko veleučilište
Università Istriana
di scienze applicate

Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Manipulators and Robots**	
Course status	Mandatory	
Year	3.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	3
	Number of hours in the semester (L+E+S)	15+30+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

Introducing students to the operation and application of robots. Training students in programming and planning the deployment of robots in various manufacturing processes.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Acquire and use basic concepts related to architectures and kinematic structures of robotic systems.
2. Acquire and use basic concepts related to types of control and guidance of robots and machines.
3. Apply acquired knowledge to design models of flexible manufacturing systems and robotic cells.
4. Construct virtual simulations of motion and behaviour of real robotic systems.
5. Program and operate real robots and robotic machines of different structures.

1.4. Course content

1. General Overview of Robotics
2. Robot and Machine Kinematics
3. Robotic Manufacturing Systems
4. Trajectory and Path Planning for Robot and Similar Machines
6. Mechanical, Energy, Measurement, and Control Systems in Robots and Machines
7. Drives in Robotic Systems
8. Types of Manipulators, Robots, and Machines in Robotic Manufacturing Systems
9. Auxiliary Devices, Equipment, and Machines in Robotic Manufacturing Systems
10. Sensors and Robot Vision
11. Programming Tools in Robotic Manufacturing Systems

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ distance learning	☒ individual exercises ☒ multimedia and network ☒ laboratory ☐ mentoring work ☐ other _____

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Project assignment	Min	Max
LO1	10%	-	5%	10%
LO2	10%	-	5%	10%
LO3	5%	20%	12.5%	25%
LO4	10%	20%	15%	30%
LO5	5%	20%	12.5%	25%
Share in ECTS	1.2	1.8	-	3
Total	40%	60%	50%	100%

Final Exam:

Learning outcome	Project assignment	Oral Examination	Min	Max
LO1	-	10%	5%	10%
LO2	-	10%	5%	10%
LO3	-	10%	5%	10%
LO4	30%	5%	17.5%	35%
LO5	30%	5%	17.5%	35%
Share in ECTS	1.8	1.2	-	3
Total	60%	40%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
The results that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E
60,00-74,99	good (3)	C
75,00-89,99	very good (4)	B
90,00-100,00	excellent (5)	A

1.8. Obligatory literature

1. Šurina, T. i Crneković, M. (1990). Industrijski roboti. Zagreb: Školska knjiga

1.9. Additional literature
1. Kovačić, Z., Bogdan, S. i Krajči, V. (2000). Osnove robotike. Zagreb: Grafis, Zagreb
1.10. Quality monitoring method
Teaching evaluations; student survey.

Istarsko veleučilište
Università Istriana
di scienze applicate

Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Methodology of Professional and Scientific Research**	
Course status	Mandatory	
Year	3.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	4
	Number of hours in the semester (L+E+S)	15+30+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

The goal of this course is to develop the skill of writing expert papers, independent search of available information bases, collection, analysis and critical review of information from various sources, and familiarization with research phases and procedures and development of ethical responsibility when writing professional papers.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Determine the basic concepts in the field of methodology of professional and research work;
2. Create and rank the main stages of the research process;
3. Analyze the significance and role of ethics in the research process;
4. Quote and paraphrase selected sources;
5. Create and shape the concept of the final thesis.

1.4. Course content

1. Introduction to science, characteristics and classification of science
2. Ethics in scientific research work
3. Basic characteristics of professional and scientific works
4. Collection and study of literature, selection of data.
5. Quoting and paraphrasing.
6. Course and phases of the research process (choice of the topic, definition of research objectives and subjects, selection of the research sample, formation of research hypotheses)
7. Presentation of research results.
8. Creation of the concept of the final thesis.

1.5. Teaching methods	☒ lectures ☒ seminars and workshops ☐ exercises ☒ distance learning	☒ individual exercises ☒ multimedia and network ☐ laboratory ☐ mentoring work ☐ other _____

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Written verification 1	Written verification 2	Final thesis concept	Min	Max
LO1	2%	6%	-	-	4%	8%
LO2	-	20%	-	10%	15%	30%
LO3	3%	-	7%	-	5%	10%
LO4	-	-	22%	-	11%	22%
LO5	-	-	-	30%	15%	30%
Share in ECTS	0.2	1	1.2	1.6	-	4
Total	5%	26%	29%	40%	50%	100%

Final Exam:

Learning outcome	Final thesis concept	Oral Exam	Min	Max
LO1	-	8%	4%	8%
LO2	20%	10%	15%	30%
LO3	-	10%	5%	10%
LO4	-	12%	11%	22%
LO5	40%	-	15%	30%
Share in ECTS	2.4	1.6	-	4
Total	60%	40%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
The results that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E
60,00-74,99	good (3)	C
75,00-89,99	very good (4)	B
90,00-100,00	excellent (5)	A

1.8. Obligatory literature

1. Materials from e-learning

1.9. Additional literature
In agreement with the student.
1.10. Quality monitoring method
Teaching evaluations; student survey.

Istarsko veleučilište
Università Istriana
di scienze applicate

Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Organization Architecture**	
Course status	Mandatory	
Year	3.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	4
	Number of hours in the semester (L+E+S)	30+30+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

The general goal of the course is to acquire theoretical and practical knowledge in the field of four elements of organizational architecture:
organizational structure, business processes, strategy and human resources. The specific objectives of the course are to acquire All of the above elements synergistically form a single model of organizational architecture that gives the company more benefits than the mere sum of these parts.
During classes, we will continuously work on recognizing: types of organizational structure and understanding the application of individual ones models, advantages and disadvantages; the importance of good design of business processes; type of strategy and optimal implementation strategies depending on the state of the company; the importance of a good personnel policy and motivating human resources in the company.
During the lecture, contemporary concepts of organizational design will be covered and students will be able to master them the application of these models, and to define and explain the types of organization architectures and enable the understanding of the specifics of each one types through discussion and contemporary examples from practice.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Interpret the term, content and elements of the organization's architecture.
2. Interpret the architecture of the organization from the aspect of efficiency, its differentiation and integration.
3. Assess the role of management in the organization's architecture.
4. Adopt modern concepts of organizational design.
5. Create different types of organization architecture.

1.4. Course content

1. Concept and content of organization architecture
2. Elements of the organization's architecture
3. Organizational architecture from the aspect of efficiency
4. Contemporary concepts of organizational design
5. Architectures of the organization

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☒ distance learning	☐ individual exercises ☒ multimedia and network ☐ laboratory ☐ mentoring work ☒ other - discussion

1.6. Students' obligations to take the exam

After arriving on mobility, the student is obliged to contact the teacher by e-mail and agree on teaching activities and obligations.

1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.

Two forms of achievement evaluation are possible:

- Continuous checking during classes
- Taking the final exam

Continuous checking:

Learning outcome	Class activity	Exercises / Tasks	Min	Max
LO1	2%	18%	10%	20%
LO2	2%	18%	10%	20%
LO3	2%	18%	10%	20%
LO4	2%	18%	10%	20%
LO5	2%	18%	10%	20%
Share in ECTS	0.4	3.6	-	4
Total	10%	90%	50%	100%

Final Exam:

Learning outcome	Oral Exam	Min	Max
LO1	20%	10%	20%
LO2	20%	10%	20%
LO3	20%	10%	20%
LO4	20%	10%	20%
LO5	20%	10%	20%
Share in ECTS	4	-	4
Total	100%	50%	100%

The student passed the course if he achieved a percentage of points that is greater than or equal to the defined minimum for each learning outcome.
The results that the student does not pass during the continuous assessment, will be taken during the examination period.
The passed learning outcome through continuous verification or through the exam period is "valid" until the course is repeated, after which it is retaken.

The final grade of the course:

Range of points %	Numerical grade	ECTS grade
0,00-49,99	insufficient (1)	FX, F
50,00-59,99	sufficient (2)	D, E

	60,00-74,99	good (3)	C	
	75,00-89,99	very good (4)	B	
	90,00-100,00	excellent (5)	A	

1.8. Obligatory literature

1. Žugaj M., Schatten M.(2005). Arhitektura suvremenih organizacija. Varaždinske toplice: Tonimir
2. Nadler D. & et.al (1992). Organizational Architecture, Designs for Changing Organisation. San Francisco: Joey-Bass

1.9. Additional literature

1. Samuelson P.A. i Nordhaus W.(1992). Ekonomija, 14. Izdanje.Zagreb: MATE
2. Žugaj M., Šehanovic J. i Cingula M.(1999). Organizacija. Varaždin: Fakultet organizacije i informatike

1.10. Quality monitoring method

Teaching evaluations; student survey.

Istarsko veleučilište
Università Istriana
di scienze applicate

Study program	**Professional Undergraduate Study Programme in Mechatronics**	
Course title	**Professional Practice**	
Course status	Mandatory	
Year	3.	
Teaching load (Lectures, Exercises, Seminars)	ECTS	7
	Number of hours in the semester (L+E+S)	0+240+0

1. DESCRIPTION OF THE COURSE

1.1. Course objectives

The aim of the course "Professional Practice" is for the student to acquire practical knowledge and skills that complement the theoretical knowledge gained or being gained through the educational process. Through professional practice, students learn to apply this knowledge in their work, thereby qualifying themselves for the job market.

1.2. Course enrolment requirements

There are no requirements for enrolling in the course.

1.3. Learning outcomes

1. Gather and study information about the organization of the company/institution where the professional practice is conducted.
2. Link theoretical knowledge acquired through the educational process with practical work in the field.
3. Master and combine techniques, skills, and tools necessary for the profession.
4. Demonstrate the application of theoretical knowledge through specific practical examples.
   effectively manage tasks at an appropriate level of expertise.

1.4. Course content

1. Familiarization with the company/institution and its organizational structure.
2. Overview of the company/institution's production, service, and/or processing activities.
3. Comprehensive understanding of the technological and work processes.
4. Introduction to, mastery of, and application of basic occupational health and safety rules, as well as company/institution-specific certifications and quality standards (quality regulations).
5. Technical and other documentation related to the company/institution's operations.
6. Description of instruments, tools, and equipment used during the professional practice, including anticipated safety measures during their use.
7. Description of methods, techniques, and skills applied during practical work, with reference to previously acquired theoretical knowledge.
8. Depending on the company's or institution's activities, the student will tailor their internship program to focus on gaining practical insights into their field of study.
9. Compilation of a Work Log documenting the activities during the professional practice.

1.5. Teaching methods	☐ lectures	☐ individual exercises

	☐ seminars and workshops ☒ exercises ☒ distance learning	☐ multimedia and network ☐ laboratory ☐ mentoring work ☐ other _____
1.6. Students' obligations to take the exam		
Regular attendance during the internship and fulfilling other obligations as outlined in the implementation program, including maintaining a daily internship journal.		
1.7. Evaluating and grading of the student work during classes and at the final exam with linking learning outcomes, teaching methods and assessment.		
The course "Professional Practice" is not graded. Evaluation of achievements is conducted through continuous assessment, where students must fulfill expected learning outcomes by regularly attending the internship and completing their internship journal. A student passes the course if they receive a Certificate of Completed Professional Practice from the company where they conducted the internship and their internship journal is verified and approved by the course instructor— the supervisor of the professional practice.		
1.8. Obligatory literature		
1. Regulation on Professional Practice 2. Documents related to professional practice (Internship Guidance, Work Log, Certificate of Completed Professional Practice, Evaluation Forms for Professional Practice)		
1.9. Additional literature		
Documentation related to the company/institution where the professional practice is conducted.		
1.10. Quality monitoring method		
Teaching evaluations; student survey.		