UBT College

Mechatronics Engineering (BSc)

SYLLABUSES

06.01.2025, PRISHTINA

Year I						
Semester I			Hours/ weeks			
No.	M/E	Subjects	L	E	ECTS	Lecturer
1	M	Introduction to Physics	2	1	5	Nexhmi Krasniqi
2	M	Introduction to Chemistry and Environment	2	1	4	Sami Makolli
3	M	Mathematics 1	2	2	5	Liridona Dodaj, Laura Gjikokaj
4	M	Introduction to Mechanics	2	2	5	Drita Qerimi, Fidan Smaili
5	M	Computer Science 1	2	2	5	Vehbi Neziri, Ylli Rexhaj
6	M	Engineering Graphics and CAD	1	2	4	Betim Shabani
7	E	English	2	0	2	Lisjeta Thaqi Jashari, Adea Haxhiavdyli
	E	German Language	2	0		Majlinda Ferati-Muja
					30	
Semester II						
No.	**M/E**	**Subjects**	**L**	**E**	**ECTS**	**Lecturer**
8	M	Fundamentals of Mechanical Engineering	2	2	5	Drita Qerimi, Xhemajl Mehmeti
9	M	Mathematics 2	3	2	5	Nazmi Misini, Hizer Leka
10	M	Material Science and Engineering	2	2	5	Fidan Smaili
11	M	Computer Science 2	2	2	5	Vehbi Neziri, Lavdim Menxhiqi

12	M	Fundamentals of Electronic and Electrical	2	2	5	Bertan Karahoda, Qendresa Syla
13	M	Laboratory 1	1	2	2	Roni Kasemi, Saranda Demolli
14	M	Economics and Engineering Management	2	0	3	Ylber Limani, Mirjeta Domniku
					30	
Year II						
Semester III						
No	**M/E**	**Subjects**	**L**	**E**	**ECTS**	**Lecturer**
15	M	Introduction to Mechatronics	2	2	5	Luan Mulaku, Roni Kasemi
16	M	Instrumentation and Measurement	2	1	4	Betim Shabani, Fidan Smaili
17	M	Laboratory 2	2	2	3	Arxhend Jetullahu, Redon Rexhepi
18	M	Digital Circuits and Signals	2	1	5	Zhilbert Tafa, Redon Rexhepi
19	M	Information Technology	2	1	5	Astrit Hulaj, Greta Ahma
20	M	Fluid and Thermodynamics	2	1	5	Drita Qerimi, Marigona Krasniqi
21	M	Law and Ethics in Engineering	2	0	3	Mevludin Shabani
					30	
Semester IV						
No	**M/E**	**Subjects**	**L**	**E**	**ECTS**	**Lecturer**
22	M	Production Automation	2	1	5	Bertan Karahoda, Arxhend Jetullahu

23	M	Modelling and Simulation	2	1	5	Galia Marianova, Xhemajl Mehmeti
24	M	Control Engineering	2	2	5	Xhemajl Mehmeti
25	M	Laboratory 3	0	2	3	Arxhend Jetullahu, Ylli Rexhaj
26	M	Software Systems Engineering	2	0	5	Ermira Daka, Mirlinda Reçica
27	M	CAD /CAM	2	2	4	Betim Shabani, Naim Ostorogllava
28	E	Entrepreneurship and Innovation	2	0	3	Sokol Loci
	E	Human Resource Management	2	0		Ermal Lubishtani
	E	Supply Chain Management	2	0		Ylber Limani
	E	Marketing	2	0		Rajan Arapi, Gonxhe Beqiri
					30	

Year III

Semester V

No	M/E	Subjects	L	E	ECTS	Lecturer
29	M	Artificial Intelligence	2	2	5	Yll Haxhimusa,
30	M	Embedded Systems	2	2	5	Astrit Ademaj
31	M	Mechatronic Systems (Design and Implementation)	2	2	5	Bertan Karahoda, Betim Shabani
32	M	Robotics	2	2	5	Xhemajl Mehmeti, Arxhend Jetullahu
33	M	Image Processing	2	1	4	Bertan Karahoda
34	M	Industrial and Organisational Psychology	2	0	3	Valdrin Krasniqi, Deniz Celcima
35	E	Application of Mechatronics in Medicine	2	1	3	Bertan Karahoda
	E	Application of Mechatronics in Agriculture	2	1		Roni Kasemi

	E	Power Electronics and Drives	2	1		Zhilbert Tafa
	E	Additive Manufacturing	2	1		Betim Shabani
	E	Renewable Energy	2	1		Drita Qerimi
	E	Special Topics in Computer Science	2	1		Lavdim Menxhiqi
	E	Augmented, Virtual & Mixed Reality	2	1		Besnik Qehaja
					30	
Semester VI						
No	**M/E**	**Subjects**	**L**	**E**	**ECTS**	**Lecturer**
36	M	Engineering Project Management	1	1	2	Bekim Marmullaku
37	M	Smart Manufacturing and Industrial Internet of Things (IIOT)	2	1	4	Zhilbert Tafa, Edmond Hajrizi
38	M	Scientific and Technical Research	1	1	2	Hasan Metin
39	M	Intership			3	Drita Qerimi, Fidan Smaili
40	M	**Thesis**			7	
		Concentration			12	
		Artificial Intelligence and Robotics				
		Electrical and Electronic Engineering				
		Energy Engineering				
		Biomedical Engineering				
		Industrial Automation and Process Control				
		Industrial Product Design				
		Telecommunications Engineering				
		Mechanical and Materials Engineering				
		Aeronautical Engineering				
		Automotive Engineering				
		Mechatronics Management				

		Artifical Intelligent and Robotics				
41		Fuzzy Logic and Control	2	1	4	Bertan Karahoda
42		Autonomous and Mobile Robotics	2	1	4	Xhemajl Mehmeti
43		Machine Learning	2	1	4	Ylli Haxhimusa
		Energy Engineering				
41		Green Energy Engineering	2	1	4	Armend Ymeri
42		Energy Efficiency	2	1	4	Drita Qerimi
43		Power System Analysis	2	1	4	Kadri Kadriu
		Industrial Automation and Process Control				
41		Production Technologies	2	1	4	Mevludin Shabani
42		Manufacturing Processes	2	1	4	Naim Ostorogllava
43		Computer Integrated Manufacturing	2	1	4	Betim Shabani
		Industrial Product Design				
41		Industrial Product Design	2	1	4	Fidan Smaili
42		Design Management	2	1	4	Mevludin Shabani
43		Sustainable Product and Process Design	2	1	4	Betim Shabani
		Biomedical Engineering				
41		Fundamentals of Biomedical Engineering	2	1	4	Zhilbert Tafa
42		Health Care Management Automation	2	1	4	Besnik Qehaja
43		Image-based diagnostics in Medical Technology	2	1	4	Bertan Karhoda
		Electrical and Electronic Engineering				
41		Signals and Systems	2	1	4	Armend Ymeri
42		Digital Signal Processing	2	1	4	Astrit Hulaj
43		Sensors	2	1	4	Kliton Bylykbashi
		Telecommunications Engineering				
41		Communication System Engineering	2	1	4	Zhilbert Tafa
42		Mobile Systems Technology	2	1	4	Jakup Retkoceri
43		Signals and Systems	2	1	4	Armend Ymeri

		Mechanical and Materials Engineering				
41		Machine Dynamics and Control	2	1	4	Xhemajl Mehmeti
42		Advanced Materials	2	1	4	Fidan Smaili
43		Fatigue and Fracture Mechanics	2	1	4	Fidan Smaili
		Computer Engineering				
41		Data Analytics and IoT	2	1	4	Yll Haxhimusa
42		Computer architecture	2	1	4	Zhilbert Tafa,
43		Human–computer interaction	2	1	4	Jakup Retkoceri
		Aerospace Engineering				
41		Aerospace Engineering Fundamentals	2	1	4	Nol Deda
42		Aerospace Dynamics and Systems	2	1	4	Xhemajl Mehmeti
43		Signals and Remote Sensing System	2	1	4	Armend Ymeri
		Automotive Engineering				
41		Vehicle Dynamics	2	1	4	Visar Baxhaku
42		Electrical and Hybrid Vehicle	2	1	4	Xhemajl Mehmeti
43		Automotive Technology	2	1	4	Beni Kizolli
		Mechatronics Management				
41		Quality Management	2	1	4	Ylber Limani
42		Logistics and Production Systems Management	2	1	4	Mevludin Shabani
43		Management Information Systems	2	1	4	Muhamet Gervalla

<table>
<tr><td>Subject</td><td colspan="4">Introduction to Physics
<table><tr><th>Type</th><th>Semester</th><th>ECTS</th><th>Code</th></tr><tr><td>Mandatory (M)</td><td>1</td><td>5</td><td></td></tr></table></td></tr>
<tr><td>Course Lecturer
Course Assistant
Course Tutor</td><td colspan="4"></td></tr>
<tr><td>Aims and Objectives</td><td colspan="4">The aim of this module is to provide an introduction to the fundamental concepts of mechanics, electricity, and optics. It is designed to support learning by building a basic knowledge foundation that students can develop further in future studies.</td></tr>
<tr><td>Learning Outcomes</td><td colspan="4">Upon successful completion of the course, students will be able to:
Understand the relationships between forces, motion, and energy, and explain their interactions based on fundamental mechanical principles.
Demonstrate knowledge of electric charges, fields, and currents, including the determination of electric and magnetic fields.
Explain the behavior of time-varying fields and predict their effects on induced electric and magnetic fields.
Understand the behavior of discrete circuit elements and apply principles of electricity to understand DC, transient, and AC circuits.
Describe the properties of light waves and apply foundational concepts to analyze basic optical systems and solve related problems.</td></tr>
<tr><td>Course Plan for 15 weeks</td><td colspan="4">Course Plan
Kinematics: Speed, Velocity, and Acceleration
Types of Motion and Newton’s Three Laws of Motion
Force, Momentum, and the Law of Conservation of Momentum
Work, Energy, and the Law of Conservation of Energy
Power and Its Applications in Mechanics
Electric Charge, Coulomb’s Law, and Electric Forces
Resistance, Ohm’s Law, and Electric Circuits
Power and Energy in Electric Currents: AC and DC Systems
Magnetism and Its Interaction with Electricity
Principles of Electromagnetism and Electromagnetic Waves
Light Waves: Reflection, Diffraction, and Interference
Refraction, Lenses, Dispersion, and Color in Optics</td></tr>
<tr><td>Teaching/Learning Methods</td><td colspan="3">Teaching/Learning Activity</td><td>Weight (%)</td></tr>
<tr><td></td><td colspan="3">1. Lectures</td><td>40%</td></tr>
<tr><td></td><td colspan="3">2. Seminars</td><td>10%</td></tr>
<tr><td></td><td colspan="3">3. Case studies</td><td>10%</td></tr>
<tr><td></td><td colspan="3">4. Numerical Exercises</td><td>20%</td></tr>
<tr><td></td><td colspan="3">5. Role play</td><td>-</td></tr>
</table>

	6. Problem-based learning			10%
	7. Study visits			10%-
	8. Work placement			-
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	2		20%
	• Group work/homework			20%
	• Mid-term exam	1		30%
	• Final exam	1		30%
Course resources	**Resources**			**Number**
	• Class (e.g)			1
	• Laboratory (e.g)			1
	• Moodle			1
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload (h)**
	• Lectures		2	30
	• Exercises		2	30
	• Practice in the industry			8
	• Seminar			20
	• Independent learning			60
	• Exams			2
Literature/References	Fundamentals of Physics, by David Halliday, Robert Resnick, and Jearl Walker, 2021 Introductory Physics II Electricity, Magnetism and Optics, Robert G. Brown, 2010			
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.			
Contact				

<table>
<tr><td>Subject</td><td colspan="4">Introduction to Chemistry and Environment
<table><tr><th>Type</th><th>Semester</th><th>ECTS</th><th>Code</th></tr><tr><td>Mandatary (M)</td><td>1</td><td>4</td><td></td></tr></table></td></tr>
<tr><td>Course Lecturer
Course Assistant
Course Tutor</td><td colspan="4"></td></tr>
<tr><td>Aims and Objectives</td><td colspan="4">The module is divided into two parts. Students in the first part will get knowledge of chemistry basics, which includes knowledge of material properties such as the structure of matter, the periodic table of elements, the electronic structure of the atom, quantum numbers, redox reactions, batteries Chemical bonds Covalent ion and metal ion bonds also recognize the structure of molecules, chemicals, classification of chemicals, solids, metals, glass, rubber, etc.

The second part of the module deals with the basic concepts of environmental chemistry -Atmospheric Chemistry, composition and pollution of the atmosphere, Basics of water chemistry, liquid waste treatment, Environmental and soil chemistry, hazardous waste from solid materials, materials toxic and radioactive.</td></tr>
<tr><td>Learning Outcomes</td><td colspan="4">• Upon course completion students will be able:

• Identify the fundamental principles of chemistry, including the structure of matter, periodic table elements, and chemical bonding.
• Recognize the types and classifications of inorganic substances, including solids, metals, plastics, and their chemical properties.
• Explain the key concepts of environmental chemistry, such as water chemistry, air pollution, and land chemistry.
• Describe the impact of chemical processes, such as redox reactions, galvanic elements, and radioactive materials, on the environment and human health.</td></tr>
<tr><td>Course Plan for 15 weeks</td><td colspan="4">Introducing

Structure of Matter

Periodic table of elements

Electronic structure of the atom

Chemical bonds and structure of molecules

Redox Reactions and Galvanic Elements, Batteries

Classification of Inorganic Substances

Solids, Metals, Glass Rubber and Plastics

Introduction to environmental chemistry

Water Chemistry

Environmental chemistry of land

Critical problems of air pollution

Radioactive materials

Presentation of case studies

Exam Preparation</td></tr>
</table>

Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			60%
	• Seminars			20%
	• Laboratory			
	• Case studies			20%
	• Role play			-
	• Problem-based learning			-
	• Study visits			
	• Work placement			
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Participation in lecturers		1-16	10%
	• Project Deliverables		1-16	30%
	• Final Exam		8-16	60%
Course resources	**Resources**			**Number**
	• Class			1
	• Laboratory			
	• Moodle			1
	• Software Microsoft Visio			
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	30
	• Seminars/Presentation			15
	• Laboratory		-	10
	• Industry practice			6
	• Independent learning			57
	• Exam			2
Literature/References	- Environmental Chemistry, Eleventh Edition, By Stanley E. Manahan, 2022 - Kimia e mjedisit - Alqi Çullaj, 2010			
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions.			

Contact	

Subject	**Mathematics 1**			
	Type	Semester	ECTS	Code
	OBLIGATORY (O)	1	5	
Course Lecturer **Course Assistant**				
Aims and Objectives	The main purpose of this course is to introduce first-year students to some fundamental concepts of mathematics, such as complex numbers, matrices and their operations, determinants and their properties, systems of linear equations, vectors and vector operations, as well as the equations of lines and planes in space, including their mutual positions. The main objective of the course is to equip students with the ability to understand and develop both simple and complex systems in mechatronics			
Learning Outcomes	As a conclusion to this course, the student should be able to: • Understand the fundamental properties of complex numbers, including their representation in trigonometric form. • Identify the principles of matrices and determinants as tools for solving systems of linear equations. • Recognize the concepts of vector algebra, including vector operations and their mathematical properties. • Explain the concepts of analytic geometry, particularly the equations of lines and planes. • Understand the theoretical basis for using computer software packages in performing mathematical calculations.			
Course Content	**Course Plan for 15 Weeks** Introducing students to the course program. Trigonometry Complex numbers. Operations with complex numbers. Trigonometric form of complex number Matrices and matrix operations Determinant Inverse matrix Systems of linear equations Definition and elementary properties of vectors. Operations with vectors. Linear dependence of vectors Scalar multiplication, vectorial multiplication and mixed multiplication of vectors. Applications Equation of planes in space in different forms, reciprocal positions of planes in space Equation of line in space in general form, in normal form, in segmental form, in canonical form Reciprocal positions between two lines in space. Reciprocal positions between the line and the plane in space			
Teaching/Learning Methods	**Teaching/Learning Activity**			

	• Lectures • Exercises • Homework	40% 30% 20%

Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz • Participation • Activity in the lecture • Final Exam	2	6,12 15 15	40% 10% 15% 35%

Course resources	**Resources**	**Number**
	• Clase (e.g) • Moodle • Projector • Table, marker	1 1 1 1

ECTS Workload	**Activity**	**Weekly hrs**	**Total workload**
	• Lecture • Exercises	2 2	30 30
	• Consultation • Self-Learning • Exam • Colloquium	1 7 1 2	12 72 2 4

Literature/References	Mathematical Applications for the Management, Life, and Social Sciences" by Ronald J. Harshbarger and James J. Reynolds is the 12th Edition, published in 2019. K. Filipi, *Algjebra dhe Gjeometria, shblu*, 2011; Bashkim Gazidede, *Algjebra 2*, Tiranë, 2006
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions.

Subject	**Introduction to Mechanics**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatary (M)	1	5	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	Throughout the semester students will develop an understanding of, and demonstrate their proficiency in the following concepts and principles pertaining to vector mechanics, statics and strength materials. • Components of a force and the resultant force for a systems of forces • Moment caused by a force acting on a rigid body • Principle of transmissibility and the line of action • Moment due to several concurrent forces • Force and moment reactions at the supports and connections of a rigid body • Force in members of a truss using the Method of Joints and the Method of Sections • Centroid and center of gravity for an area and a rigid body • Moment of inertia and radius of gyration of a composite area • Force, stress and deformation will be analysed for various types of loading conditions			
Learning Outcomes	Upon completion of this course, the student will be able to: • Understand fundamental principles used in the study of mechanics. • Define magnitude and directions of forces and moments and identify associated scalar and vector products. • Compute the moment of force about a specified point or line. • Solve problems involving equilibrium of rigid bodies subjected to a system of forces and moments that include friction. • The student will be able to conduct stress analysis for a member under axial load, torque, transverse load, or their combination			
Course Content for 15 weeks	• Introduction, Machine Elements, types and classification • Force vectors • Equilibrium of a Particle (Condition for the Equilibrium, The Free-Body Diagram) • Force System Resultants (Forces and moments) • Moment of force about an axis, moment of a Couple • Equilibrium of a Rigid Body (Equilibrium in Two and Three Dimensions) • Structural Analysis • Internal Forces • Friction • Stress and Strain • Axial load, torsion, bending and shear, and combined loadings • Mechanical properties of materials			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			40%
	• Seminars			10%
	• Case studies			10%
	• Numerical Exercises			30%

	• Role play			-
	• Problem-based learning			10%
	• Study visits			-
	• Work placement			-
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	2	2	20%
	• Group work/homework			20%
	• Mid-term exam	1	7	30%
	• Final exam			30%
Course resources	**Resources**			**Number**
	• Class (e.g)			1
	• Laboratory (e.g)			
	• Moodle			1
	• Softueri			
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	30
	• Numerical Exercises		2	30
	• Laboratory			0
	• Practice in the industry			4
	• Independent learning			62
	• Exams			3
Literature/References	Vector Mechanics for Engineers: Statics and Dynamics 10th Edition by Ferdinand Beer (Author), E. Russell Johnston, Jr. (Author), David Mazurek (Author), Phillip Cornwell (Author) Mechanics of Materials Edition by Russell Hibbeler (Author) Meriam and Kraige. 2011. Engineering Mechanics - Statics, SI Version, Wiley. Engineering Mechanics: Statistics in Si Units 14th Editionby Russell Hibbeler (Author)			
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions.			

Subject	**Computer Science 1**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatory (M)	1	5	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	Introduce students to basic concepts of Computer Science and programming. Prepare students to solve different problems by applying critical thinking. Teach students to develop algorithms both with flowchart and coding. Introduce different development environments for the C programming language.			
Learning Outcomes	• Understand basic concepts of hardware and software. • Understand the logic of algorithms and exhibit problem-solving skills. • Be able to use concepts like loops, conditionals, arrays and functions. • Understand syntax of C programming language. • Demonstrate a basic understanding of low-level programming			
Course Content (for 15 weeks)	How the computer works (Hardware & Software) Algorithm with flowcharts Numerical systems Introduction to C (Logic & Workspace) Data types (storing, manipulating) Conditionals (if, else if, switch) Loops (while, do while, for loop) Arrays Functions			
Teaching/ Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			20%
	• Exercises			20%
	• Homework			10%
	• Self-study			50%
Assessment Methods	• Lectures			20%
	• Individual projects	2	8,14	30%
	• Final exam	1	15	70%

Course resources	**Resources**		**Number**
	• Classroom		1
	• IT laboratory		1
	• Moodle		
	• CodeBlocks/C Development Environment		
	• Beamer (Projector)		
ECTS Workload	**Activity**	**Weekly hrs**	**Total workload**
	• Lectures	2	30
	• Exercises	2	30
	• Homework		10
	• Self-Learning		78
	• Exams		2
Literature/References	C Programming: A Modern Approach, Kim N. King (2008). Flowchart and Algorithm Basics The Art of Programming, A. B. Chaudhuri, 2020 C Programming Language, 2nd Edition, Dennis M. Ritchie, Brian W. Kernighan. C++ Permbledhje Detyrash 1, Vehbi Neziri (2020) Instructions provided relevant teaching material (notes) in Albanian and English and internet links		
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.		
Contact			

Subject	**Engineering Graphics and CAD**			
	Type	**Semester**	**ECTS**	**Code**
	OBLIGATORY (O)	1	4	
Course Lecturer **Course Assistant**				
Goals and Objectives	Through this course, students will be equipped with knowledge and skills related to Engineering Graphics and CAD. Specific notions will be elaborated separately starting with instructions for drawing, orthography, auxiliary and section view, dimensioning, isometric and working drawing, screw fasteners, tolerances and surface texture. The aim of this course is to provide students with scientific and engineering knowledge in the relevant field, including theoretical and practical expertise. Based on this goal it is intended to meet the objectives so that every student can apply and understand engineering graphics and CAD along with the necessary requirements.			
Learning Outcomes	Upon completion of this course, students will be able to: • Understand the notions of engineering graphics • Execute objects in 2D and 3D • Apply technical drawings with its rules • Use CAD technologies for implementation			
Course Content	The course plan for 15 weeks will be as follows: Notification and organization of the course; Guidelines for drafting; Standard orthographic drawing views; Auxiliary drawing view; Section drawing view; Basic dimensioning; Isometric drawing; Semester project I; Working drawing; Screw fasteners; General tolerance and dimensioning; Geometric tolerance and dimensioning; Surface texture; Semester project II; Final project.			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			30%
	• Examples			20%
	• Exercises			20%
	• Case studies			10%
	• Role simulation			10%
	• Problem solving			10%
Assessment Methods	**Assessment Activity**		**Week**	**Weight (%)**
	• Participation		15	10%
	• Activity in lecture		15	10%
	• Exam		15	80%
Course resources	**Resources**			**Number**
	• Class			1
	• Moodle			1
	• Software			1
	• Projector			1
	• PC or Laptop			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		1	15
	• Examples			55
	• Exercises		2	30
	• Independent learning			20
Literature/References	Basic literature: • Edward E. Osakue. (2018). Introductory Engineering Graphics. Momentum Press, LLC. ISBN-13: 978-1-94708-361-5 Additional literature:			

	• Kirstie Plantenberg. (2016). ENGINEERING GRAPHICS ESSENTIALS FIFTH EDITION. SOC Publications. ISBN-13: 978-1-63057-052-l • K.C. John. (2009). Engineering Graphics for Diploma. PHI Learning Private Limited. ISBN 978-81-203-3722-0 • Aleksandr Yurievich Brailov. (2016). Engineering Graphics: Theoretical Foundations of Engineering Geometry for Design. Springer International Publishing Switzerland. ISBN 978-3-319-29719-4 • Colin H Simmons, Dennis E Maguire. (2004). Manual of Engineering Drawing Second edition. Elsevier Newnes. ISBN 0 7506 5120 2 • Frederick Giesecke, Shawna Lockhart, Marla Goodman, Cindy M. Johnson. (2016). Technical Drawing with Engineering Graphics Fifteenth Edition. Pearson Education, Inc. ISBN 978-0-13-430641-4 • Mitchell, Alva; Spencer, Henry Cecil; Hill, Ivan Leroy; Dygdon, John Thomas; Novak, James E. Giesecke, Frederick E. (2003). Technical Drawing. Pearson College Div. ISBN 9780130081834. (UBT Library - Barcode: 002-289077, Biblionumber: 14801)
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including exam, activity in lectures and participation. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.
Contact	

Subject	**English**			
	Type	Semester	ECTS	Code
	Elective (E)	1	2	
Course Lecturer				
Aims and Objectives	English I- is a language course designed from the perspective of professional and technical English for students of Engineering and Mechatronics. This course provides a basic foundation in grammar (Simple Present Tense, Simple Past Tense, Present Continuous Tense, and Future Tense) and it focuses on four main language skills: listening, reading, writing, and speaking. It focuses on language used in everyday situations of engineering, using a variety of textbooks, materials, and real-life examples to develop students' language skills. Vocabulary and the study of correct and simple grammatical structures are integrated with the above-mentioned areas.			
Learning Outcomes	By the end of the course, students will: • Demonstrate understanding of technical vocabulary and fundamental concepts related to various branches of engineering • Apply appropriate language skills to describe engineering materials, tools, processes, and measurements • Utilize problem-solving and creative thinking skills in engineering contexts			
Course Content	Course Plan for 15 weeks Introduction to the course & Placement test What is engineering & Shapes Materials & Tools Energy & Simple Machines Working with numbers & Types of measurement The scientific method & Safety precautions Civil engineering & Chemical engineering Mechanical, electrical and aerospace engineering History of engineering & Traits of an engineer			

	An engineer's education & Presenting information Problem solving & Creativity Tables and graphs & Dimensions and Drawings Revision and preparation for final test

Teaching/ Learning Methods	• Teaching/Learning Activity	Weight (%)
	• Lectures	20%
	• Seminars	20%
	• Laboratory	--
	• Case studies	40%
	• Role play	---
	• Problem-based learning	20 %
	• Study visits	
	• Work placement	

Assessment Methods	Assessment Activity	Number	Week	Weight (%)
	Participation	15	1-15	5%
	Class activity	15	1-15	5%
	Reflection paper (presentations, homework, papers)	15	1-15	20%
	Mid-term test	1	7	30%
	Exam	1	13	40%

Course resources	• Resources	Number
	• Classroom	1
	• Laboratory	1
	• Moodle	1
	• Laptop	1
	• Projector	1
	• Laud speakers	1

ECTS Workload	• Activity	Weekly hrs	Total workload
	• Lecture	2	30
	• Seminars	1	6
	• Pairwork	1	10
	• Classwork	1	6
	• Homework	1	6
	• Exam	1	2

Ethics	Code of Ethics and Academic Integrity This course follows UBT College's Code of Ethics, and all students must uphold academic integrity in all assessments. Cheating, plagiarism, or dishonesty will result in serious consequences, including failure in the assessment or course, and disciplinary action. **Exams (30% Mid-Term, 40% Final):** Exams must be completed independently. Unauthorized materials or collaboration are strictly prohibited. Any misconduct will lead to failure of the exam and possible further disciplinary action. **Presentations (20%):** Presentations must be based on your own work and research. Plagiarism or dishonesty will be monitored and may result in a zero for the presentation. **Class Participation (10%):** Active, respectful participation in class discussions is required. Disruptive behavior or dishonesty may result in penalties.
Literature/ References	Career paths – English for engineering by Charles Lloyd & James A. Frazier – Express Publishing, 2012

Subject	**German Language**			
	Type	**Semester**	**ECTS**	**Code**
	Elective(E)	1	2	
Course Lecturer **Course Assistant**				
Goals and Objectives	develop the ability to write and communicate using the target language - offer insights into the culture and society of countries where the language is spoken (German speaking countries) - develop awareness of the nature of language and language learning - encourage positive attitudes towards speakers of other languages and a sympathetic approach to other cultures and civilizations - provide enjoyment and intellectual stimulation - develop transferable skills (e.g. analysis, memorizing, drawing of inferences) to complement other areas of the curriculum			
Learning Outcomes	• An understand and use familiar expression using the target language • Make use of vocabulary available and their knowledge of grammar Structures • Work out set texts and produce their own ones and write these in a way the language is understood			
Course Content	*German Alphabet, pronunciation, spelling* *Personal and social life* - Establish contact with a person: greet and respond to a greeting, offer a welcome, *Family and personal relationships* - Understanding and responding to everyday queries like instruction, questions, short telephone messages, requests, etc., - fill in basic information on forms, cardinal numbers *Shopping* *Eating and drinking* o indefinite and negative article, nouns, singular and plural *Accommodation* - describe flats and houses, assess prices, find information on a website - understand simple expressions and phrases on topics that is directly related to the person in question and his/her habits, life, routine, likes/dislikes, o definite article, negation, personal pronouns, adjectives *My day* - ability to speak clearly and concisely about situations that involves direct or indirect exchange of information on simple topics separable verbs, temporal prepositions *The weather, hobbies, sports and leisure time activities* o accusative, definite article and negative article Children and school - activities in the past - understanding of matters that are familiar and are encountered regularly like instances at school, work, at public places, places of leisure etc., - perfect, modular verbs, - separable verbs - Exam preparation			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	1. Interactive lectures			100%
	Modern teaching techniques and education aids will be used to attract the attention of the participants to better understand the program			

Assessment Methods	**Assessment Activity**	**Week**	**Weight (%)**
	• Participation	15	10%
	• Oral examination	15	20%
	• Final Exam	15	70%
Course resources	**Resources**		**Number**
	• Class		1
	• Moodle		1
	• Software		
	• Projector		1
	• PC or Laptop		
ECTS Workload	**Activity**	**Weekly hrs**	**Total workload**
	• Lectures	1	30
	• Independent learning		22
	• Work in class	2	6
	• Final Exam		2
Literature/References	D. Niebisch, S.Penning-Hiemstra, F. Specht, M. Bovermann, A. Pude, Schritte Plus Neu, Neveau 1/1- Kursbuch und Arbeitsbuch, Hueber Verlag, Würzburg, 2023 Übersetzt von Nurije Kabashi,Schritte Plus Neu, Deutsch als Zweitsprache GlossarA1, Deutsch , 2016 Albanisch, Gjermanisht-Shqip, Hueber Verlag, München,2016 B.Gottstein-Schramm, S. Kalender, F. Specht, B. Duckstein, Schritte – Übungsgrammatik, Niveau A1- B1, HueberVerlag, Ismanig, 2010 www.hueber.de/woerterbuch/online/?wb=&wbolang=de&sString=haus&modus=de-en&site=1&rl=true www.hueber.de/exercises/530-25129/?rootPath=/exercises/530-25129/		
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including exam, activity in lectures and participation. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.		
Contact			

<table>
<tr><td>Subject</td><td colspan="4">Fundamentals of Mechanical Engineering</td></tr>
<tr><td></td><td>Type</td><td>Semester</td><td>ECTS</td><td>Code</td></tr>
<tr><td></td><td>Mandatory (M)</td><td>2</td><td>5</td><td></td></tr>
<tr><td>Course Lecturer

Course Assistant
Course Tutor</td><td colspan="4"></td></tr>
<tr><td>Aims and Objectives</td><td colspan="4">● Acquire knowledge of basics kinematics lows of particle, rigid bodies and simple systems of rigid bodies.
● The abilities of applications and expansion the learned in other courses are expected.
● Acquire knowledge of the analytic approach to formulation and solving dynamic equilibrium problems (loading and motions influence on internal force and reactions).
● Apply the knowledge and tools of dynamics to solve engineering problems,
● Explain your knowledge to peers through hand-written problem sets, verbalization, and writing</td></tr>
<tr><td>Learning Outcomes</td><td colspan="4">Upon completion of this course, the student will be able to:
• Define basic kinematic quantities of rectilinear and curvilinear motion of particle such as: position, displacement, velocity and acceleration,
• Describe and understand plane kinematics of rigid bodies,
• Explain basic terms in kinetics of particles and of rigid bodies: Newton’s second law, work and kinetic energy, impulse and momentum, gravitational and elastic potential energy
• Describe the function of a mechanical power transmission system (torque, speed, reduction, multiplication)</td></tr>
<tr><td>Course Content
for 15 weeks</td><td colspan="4">Course Plan

Kinematics of particles: Rectilinear Motion,
General Curvilinear Motion
Kinetics of a Particle: Force and Acceleration
Kinetics of a Particle: Work and Energy
Kinetics of a Particle: Impulse and Momentum
Planar Kinematics of a Rigid Body
Planar Kinetics of a Rigid Body: Force and Acceleration
Planar Kinetics of a Rigid Body: Work and Energy
Vibrations: Undamped Free and Forced Vibration
Vibrations: Viscous Damped Free and Forced Vibration
Mechanical Power Transmission
Mechanical power transmission (torque, rotary speed)</td></tr>
<tr><td></td><td colspan="3">Teaching/Learning Activity</td><td>Weight (%)</td></tr>
</table>

Teaching/Learning Methods	• Lectures			40%
	• Exercises			40%
	• Consultations			10%
	• Case studies			10%
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Mid-term exam:	2	7	40%
	• Final Exams	4	14	40%
	• Tasks	4	3, 6, 9, 12	10%
	• Attendence/Participation		1…12	10%
Course resources	**Resources**			**Number**
	• Classroom (e.g)			1
	• Blackboard, markers			1
	• Moodle			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures			30
	• Exercises			30
	• Consultations			6
	• Independent Study			56
	• Exams			3
Literature/References	Engineering Mechanics-DYNAMIC, R. C. HIBBELER, 14th Edition, 2014 Vector Mechanics for Engineers: Statics and Dynamics 10th Edition by Ferdinand Beer (Author), E. Russell Johnston, Jr. (Author), David Mazurek (Author), Phillip Cornwell (Author) Classical Mechanics, Herbert Goldstein, Charles P. Poole & John Safko, 2011			
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. Exams: All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions			

Subject	**Mathematics 2** **Type** Semester ECTS Code OBLIGATORY (O) 2 5
Course Lecturer **Course Assistant**	
Aims and Objectives	The student should be prepared with knowledge of functions, limits of sequences and functions, derivatives of functions, indefinite and definite integrals, as well as knowledge of partial differential equations, which find application in both mathematical disciplines and natural, technical, computer sciences, economic etc. The purpose of the mathematics II curse is to provide students with a solid foundation in calculus and its applications, with a specific focus on engineering contexts. The course aims to equip students with the mathematical tools necessary to analyze and solve engineering problems.
Learning Outcomes	As a conclusion to this course, the student should be able to: • Demonstrate a solid understanding of the fundamental concepts of calculus, including limits, derivatives, and integrals • Apply calculus concepts to solve engineering problems, including optimization, rates of change, and related rates. • Understand and apply techniques of integration, including substitution, integration by parts, and partial fraction decomposition. • Understand and apply first-order linear partial differential equations and recognize their importance in modeling physical phenomena.
Course Content	**Course Plan for 15 Weeks** Functions in one variable Numerical sequence. Limit of sequences Limit and continuity of a function Derivative of a function. Derivation rules Derivative of composite function and higher order derivatives. Differential Indefinite integral Integration methods Definite integral and its applications Multivariable functions and their properties Partial derivatives and differential of a multivariable function Partial differential equations First order linear partial differential equations
Teaching/Learning Methods	**Teaching/Learning Activity** The classes will be organized in three hours of lectures and two hours of exercises. In the lectures we will introduce the meaning of the material in the table. The exercises will be held by solving various problems by cooperating with the students. The study will be done by engaging students directly in the classroom, giving them the tasks, they
Assessment Methods	**Assessment Activity** **Number** **Week** **Weight (%)** • Quiz 6,12 40% • Participation 15 10% • Activity in the lecture 15 15% • Final Exam 35%
Course resources	**Resources** **Number**

	• Clase (e.g)	1
	• Moodle	1
	• Projector	1
	• Table, marker	1

ECTS Workload	**Activity**	**Weekly hrs**	**Total workload**
	• Lecture	2	30
	• Exercises	2	30
	• Consultation	1	12
	• Self-Learning	7	72
	• Exam	1	2
	• Colloquium	2	4

Literature/References	Calculus for Engineers (4th Edition) 4th Edition by Donald Trim (Author), 2020 Ejup Hamiti, Matematika II, Prishtinë (2008) Sadri Shkodra, Matematika II,- Prishtinë (2004) Mendi Doko, Përmbledhje detyrash nga matematika II, Prishtinë Harshbarger R.&Reynolds J.: Mathematical applications, New York (2004) Walter A. Strauss: Partial Differential Equations, An introduction, John Wiley & Sons, Inc. (2008)
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions.
Contact	

Subject	**Materials Science and Engineering**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatory (M)	2	5	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	This course is an introduction to three topics fundamental to materials science and engineering: structure, bonding, mechanical and electrical properties. These topics are not traditionally taught in tandem, but based on the industry requirements, their future employees have to have a solid knowledge of these topics, and therefore our objective here is to bring students up to date with these topics. The motivation for bringing these topics together in Materials Science and Engineering is to aid in teaching the conceptual ties between these topics. Bonding dictates structure, and structure, in turn, provides constraints on the mechanical and electrical properties of materials.			
Learning Outcomes	Students will be able to: ● Understand of structure, bonding, mechanical and electrical properties of materials; ● Be able to select materials based on mechanical and electrical properties of design requirements; ● Describe and predict elastic deformation in isotropic and anisotropic engineering materials; ● Describe and predict yielding of engineering materials under uniaxial states of stress; ● Describe the major microstructural-based mechanisms of strengthening in (crystalline) materials, and apply these principles to alloy and process design; ● Understand the electrical conduction in metals and alloys and application of smart materials in Ionic and super-ionic conductors in the industry.			
Course Content	**Course Plan for 15 weeks** Introduction to materials sciences, Materials classification (isotropic and anisotropic) and their structure Atomic bonding and crystal lattice of solid body Iron-Carbon phase diagram Mechanical properties of materials under uniaxial load Destructive and non-destructive testing methods Alloys, manufacturing process and their practical usage. Strengthening mechanism of materials Defects on solid body Electrical resistivity of metals and alloys, Ionic and super-ionic conductors, their properties and applications. Ferroelectric thin films, Integrated ferroelectrics, Actuators and Smart-materials.			

Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			40%
	• Seminars			10%
	• Case studies			10%
	• Numerical Exercises			30%
	• Role play			-
	• Problem-based learning			10%
	• Study visits			-
	• Work placement			-
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	2	2	20%
	• Group work/homework			20%
	• Mid-term exam	1	7	30%
	• Final exam			30%
Course resources	**Resources**			**Number**
	• Class (e.g)			1
	• Laboratory (e.g)			
	• Moodle			1
	• Microsoft office – Excel for evaluation of experimental test results			1
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	30
	• Numerical Exercises		2	30
	• Laboratory			0
	• Practice in the industry			4
	• Independent learning			60
	• Exams			5
Literature/References	Materials Science and Engineering: An Introduction, 10th Edition William D. Callister Jr., David G. Rethwisch (2018) Solymar, L. and Walsh, Lectures on Electrical Properties of Materials, Oxford University Press (2004). Materials Selection in Mechanical Design 5th Edition, Michael F. Ashby (2017);			
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any			

	form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. **Exams (40% Mid-Term, 40% Final):** All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions.
Contact	

Subject	**Computer Science 2**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatory (M)	2	5	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	Be able to follow the topics from Computer Science and apply the knowledge to understand more complex topics such as functions, pointers, file manipulation, etc. By the end of the course, students will learn the basic concepts of object-oriented programming, and the GUI using C++.			
Learning Outcomes	At the conclusion of this subject, students should have the skills to: ● Describe function types in detail in C ● Demonstrate a basic understanding of pointers and their use ● Understand on sufficient level file manipulation in C ● Demonstrate a basic understanding of enumerations and structs ● Implement basic GUI using C++ tools			
Recommended prerequisites:	• Computer Science 1			
Course Content (for 15 weeks)	Introduction General Review (conditionals, loops) Pointers File I/O (Data Handling) Data Structures (enumeration, structs) Introduction to object-oriented (C++) GUI (Graphical User Interface)			

Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			20%
	• Exercises			20%
	• Homework			10%
	• Self-study			50%
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Midterm projects	2	8-15	30%
	• Midterm exam			30%
	• Final exam	1	15	40%
Course resources	**Resources**			**Number**
	• Classroom			1
	• IT laboratory			1
	• Moodle			1
	• CodeBlocks/C Development Environment			1
	• Beamer (Projector)			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	30
	• Exercises		2	30
	• Homework			10
	• Self-Learning			78
	• Exams			2
Literature/References	• Lecture notes, manuals and handbooks • C Programming: A Modern Approach, Kim N. King (2008). • C Programming Language, 2nd Edition, Dennis M. Ritchie, Brian W. Kernighan. • C++ Permbledhje Detyrash 2, Vehbi Neziri (2020) • Instructions provided relevant teaching material (notes) in Albanian and English and internet links			
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.			
Contact				

Subject	**Fundamentals of Electrical and Electronics Engineering**			
	Type	**Semester**	**ECTS**	**Code**
	Obligatory (O)	2	5	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	The course provides the fundamentals of electronic and electrical engineering. Electronics is the foundational materials for mechatronics engineering. The course provides an introduction to the design of electronic circuits used to implement electronic systems. Basic core material includes the electronic properties of materials, diodes, logic families and storage elements. Towards the end of the course students are provided with more advanced topics in design parameters, interfacing, circuit modelling and simulation and operational amplifiers. Key introductory topics include: electronic properties of materials, Diodes, MOS Transistors, MOS logic families, Bipolar transistors, Design parameters, Storage elements, Interfacing logic families, operational amplifiers.			
Learning Outcomes	Upon successful completion of the course, the student is expected to: ● Understand the electrical and electronic components used to implement circuits ● Understand the diodes, transistors and their functions ● Design / Implement electronic and electrical circuits for different applications in mechatronics ● Indicate the importance of designing data conversion circuits ● Identify software products used for designing and simulating circuits ● Describe how Mechatronics Engineering benefits from electronics			
Course Content for 15 weeks	**Course Plan** Introduction Electrical charges, voltage, current Resistor Circuits Capacitors, Inductors Electrical Energy and Power Kirchhoff's laws AC Circuits and AC analysis Semiconductors, Diodes Diode Applications Bipolar Transistors, DC Analysis MOS Transistors Integrated Circuits, Logic Families			

	Operational Amplifiers Data Conversion Filters			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			50%
	• Numerical Exercises			30%
	• Laboratory			-
	• Case studies			-
	• Role play			-
	• Problem-based learning			20%
	• Study visits			-
	• Work placement			-
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	2		40%
	• Individual Project	-	-	-
	• Midterm	-	-	-
	• Final Exam	1	-	60%
Course resources	**Resources**			**Number**
	• Classroom(e.g)			1
	• Laboratory (e.g)			-
	• Moodle			1
	• Software			-
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	30
	• Numerical Exercises		1	15
	• Laboratory			
	• Assignments		-	15
	• Independent Study			88
	• Exam		-	2

Literature/References	Mike Tooley, Electronic Circuits: Fundamentals and Applications, (2019). Robert L. Boylestad, (2020), Electronic Devices and Circuit Theory, Pearson Publishing Chen (2004), The Electrical Engineering Handbook, Academic Press Jones (2004), Electrical and Electronic Problems and Challenges, Dearborn Trade Publishing Sriniovas (2014), Basic Electronic Engineering, I.K. International
Ethical Standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. **Exams (40% Quiz, 60% Final)**: All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions.
Contact	

Subject	**Laboratory 1**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatory (M)	2	2	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	In this course, students will be introduced to electric circuit components, their basic properties, and simple applications. They will identify and describe the functions of various circuit elements and demonstrate their ability to construct basic circuits using standard components. Students will document their work through practical manuals to reinforce their learning and recall foundational concepts. By the end of the course, participants will be able to recognize and reproduce simple electric circuits and their applications			
Learning Outcomes	• Understand laboratory safety, instruments, electronic circuits. • Be able to read and understand electronic circuits • Be able to build an electronic circuit using components like resistors, capacitors, transistors, diodes and op-amps.			
Course Content (for 15 weeks)	Introduction Safety on LAB Voltage measurement Resistance measurement Current measurement			

	Ohm’s Law Series circuits Parallel circuits Series-Parallel combination circuits Capacitors RC Circuits Diodes Transistors Op Amps			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			20%
	• Exercises			40%
	• Case studies			10%
	• Problem-based learning			10%
	• Self-study			20%
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Individual projects	1	15	50%
	• Final exam	1	15	50%
Course resources	**Resources**			**Number**
	• Laboratory			1
	• Moodle			1
	• Falstad			
	• Beamer (Projector)			

	Activity	Weekly hrs	Total workload
ECTS Workload	• Lectures	1	15
	• Exercises	2	30
	• Self-Learning		13
	• Exams	1	2
Literature/References	● Practical Electronics for Inventors, Fourth Edition 4th Edition, Paul Scherz, Simon Monk, 2016 ● Laboratory working manuals (weekly) ● Electronic Devices and Circuit Theory 11th Edition, by Robert Boylestad (Author), Louis Nashelsky (Author)		
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.		
Contact			

Subject	**Economics and Engineering Management**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatary (M)	2	3	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	The course is designed to provide basic concepts of management and economics for engineers. Economics is the study of value, costs, resources and their relationship in a given context or situation. In the discipline of Mechatronics, engineering activities have costs and other economic attributes. The first part of the course provides an opportunity for students to learn about the basics of engineering economics and management, production concepts, and practical application of economics in engineering and management contexts exploring the basic management roles and functions and organisational design models. In the second part the course provides with the basic concepts of economics focusing on main factors of economic development and economic growth, and productivity with the focus on economic activity efficiency and effectiveness of businesses and organizations. At the end the course provides with the sights related to the marketing, digital economy, and with the concepts of time value of money, return on investment , and cost an benefit analyses in engineering.			
Learning Outcomes	**Upon completion of this module, engineering students will be capable to:** ● Learn and understand the fundamental concepts and principles of economics and management; ● Learn and understand the digital economy basics in the context of marketing and sales; ● Understand the essentials financial management with focus on time value of money concept and on return on investment. ● Understand and explain cost and benefit analyses in engineering enterprises.			

Course Content	**Course Plan**	**Week**
	Introduction to Economics and engineering management	1
	Essentials of engineering management	2
	Functions and activities of engineering management	3
	Essentials of Production Management	4
	Management: organizational structures	5
	Product development management	6
	Leadership, Decision-making and HRM	7
	Quality management and continuous improvement	8
	Introduction to Economics: Economic growth and economic development	9
	Theory and Practice of Production-Productivity	10
	Markets and digital marketing	11
	Digital economy, basic concepts	12
	Financial management: Time Value of money	13
	Case Studies / Problems and solutions in Economics	14
	Final exam	15

Teaching/Learning Methods	**Teaching/Learning Activity**	**Weight (%)**
	1. Lectures	70%
	2. Seminars	10%
	3. Practice	0%
	4. Case studies	10%
	5. Role play	-
	6. Problem-based learning	10%
	7. Study visits	-
	8. Work placement	-

Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	2	5,,11	10%
	• Group work/project/ case study	1		25%
	• Mid-term exam	1		15%
	• Final exam	1		50%

Course resources	**Resources**	**Number**
	• Class (e.g)	1
	• Laboratory (e.g)	1

	• Moodle • Softueri MATLAB/SPSS/Python • Projector		
ECTS Workload	**Activity**	**Weekly hrs**	**Total workload**
	• Lectures	2	30
	• Seminars		4
	• Laboratory	2	
	• Practice in the industry		2
	• Independent learning		68
	• Exams		2
Literature/References	PowerPoint Slides for each lecture Exercises Web pages-recommended Kiran, D.R. Principles of Economics and Management for Manufacturing Engineering 1st Edition (2023) Butterworth-Heinemann Park, s., Ch. 2019. *Fundamentals of Engineering Economics*. 4th edition. Pearson. Paneerselvam. R 2013. Engineering *Economics*. PHI publication L.M.Prasad. 2013. *Principles and Practices of Management*. 8th ed. Sultan Chand & Sons Newman, Donald G., Eschenbach, Ted G., and Lavelle, Jerome P. (2012). Engineering Economic Analysis. New York: Oxford University Press.		
Contact			
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. **Exams (15% Mid-Term, 50% Final):** All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions. **Case Study Analysis (25%):** Case study analyses must reflect the student's own independent work. Collaboration, if permitted, must be properly cited. Plagiarism in case study submissions will be monitored using Turnitin. The similarity index must be below 15% (excluding references, quotes, and small sources).		

Subject	**Introduction to Mechatronics**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatory (M)	3	5	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	This course equips students with the necessary skills in various fields of mechatronics with an emphasis on the topics that will be covered in the curriculum in the following years. During the lectures, the focus will be on combining the main fields of mechatronics, in order to be able to create fully functional mechatronic systems.			
Learning Outcomes	Upon successful completion of the course, students will be able to: ● Explain the underlying operational principles and construction of actuators such as DC, AC, Servo, and Stepper motors. ● Identify and be able to apply various transducers and sensors in practice based on task requirements. ● Be able to specify the signal types, and know how to process them with techniques such as ADC, DAC, filtering, etc. ● Use programming languages and adequate hardware to control mechatronic components. ● Undertake independent research and analysis and think creatively about engineering problem-solving			
	Course Plan for 15 weeks The History of Engineering-Introduction to Mechatronics Elements of Engineering Analysis Sensors and Transducers (performance terminology, displacement, velocity, force, pressure) Sensors and Transducers (flow, level, temperature, light) Signal Conditioning (digital signals, ADC, DAC, multiplexer, DSP) Actuating Systems (pneumatic, hydraulic) Actuating Systems (Mechanical) Actuating Systems (DC motor) Actuating Systems (AC motor, stepper motor, switches) Microcontroller programming to control mechatronic systems			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			60%
	• Seminars			10%
	• Case studies			10%
	• Numerical Exercises			-

	• Role play			-
	• Problem-based learning			10%
	• Study visits			10%-
	• Work placement			-
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	2		20%
	• Group work/homework			20%
	• Mid-term exam	1		30%
	• Final exam	1		30%
Course resources	**Resources**			**Number**
	• Class (e.g)			1
	• Laboratory (e.g)			1
	• Moodle			1
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload (h)**
	• Lectures		2	30
	• Practice in the industry			8
	• Seminar			30
	• Independent learning			80
	• Exams			2
Literature/References	Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering 2019 Mechatronic Systems, Sensors, and Actuators Fundamentals and Modeling By Robert H. Bishop · 2017 Internet resources in subjects related to Mechatronics.			
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.			
Contact				

Subject	**Measurements and Instrumentation**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatory (M)	3	4	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	This course is intended to give students adequate knowledge on measuring physical parameters, prepare the measured experimental data on adequate graphs, in order to interpret and write conclusions for their relationship and their behaviour. The motivation for bringing these topics together in Measurements and instrumentation is to aid in teaching the conceptual ties between these topics. Monitoring and measuring the behaviour of parameters could help future engineers to improve and control industrial processes, in turn, Labview software provides a great opportunity for graphical programming and monitoring these parameters by using specific sensors and microcontroller.			
Learning Outcomes	Students will be able to: Understand the operation and application of measurement devices, such as multimeters, vernier calipers, micrometers, and indicators, for precise data collection. Develop and analyze simple block diagrams in LabVIEW to interface with microcontrollers and monitor physical parameters. Measure electrical and physical parameters using Data Acquisition Devices and LabVIEW software, and perform detailed analysis of the collected data. Analyze relationships between measured variables, predict trends, and represent data effectively using appropriate graphs and visualization techniques			
Course Content	**Course Plan for 15 weeks** Introduction to metrology, Block Schematics of Measuring Systems, Performance Characteristics, Accuracy, Precision, Resolution Types of Errors and uncertainties Types of distribution of experimental data (normal, exponential, triangular etc.) Linear, semi-logarithmic and logarithmic graphs of experimental data Measuring Instruments: Analog and Digital Multimeters. Vernier Caliper, Micrometers, Indicators. Transducers: Classification, Strain gauges; Force and Displacement Transducers, LVDT, Thermocouples. Amplifiers.			

	Measurement of Physical Parameters: Liquid level Measurement, Measurement of Humidity and Moisture, Velocity, Force, Pressure sensors, Temperature -Measurements, Data Acquisition Systems. Labview interfacing with microcontroller and Data Acquisition devices.			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			40%
	• Seminars			10%
	• Case studies			10%
	• Numerical Exercises			30%
	• Role play			-
	• Problem-based learning			10%
	• Study visits			-
	• Work placement			-
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	2	2	20%
	• Group work/homework			20%
	• Mid-term exam	1	7	30%
	• Final exam			30%
Course resources	**Resources**			**Number**
	• Class (e.g)			1
	• Laboratory (e.g)			1
	• Moodle			1
	• Microsoft office – Excel for evaluation of experimental test results and Labview for programing			1
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	30
	• Numerical Exercises			
	• Laboratory		1	15
	• Practice in the industry			15
	• Independent learning			65

	• Exams 5
Literature/References	Text books: Dr.sc. Shpetim Lajqi, Dr. sc. Mulsi Bajraktati, Teoria dhe teknika e matjeve, 2018 Dr.sc. Ali Gashi, Matje Elektrike, 2016. Additional: Metrology and Instrumentation: Practical Applications for Engineering and Manufacturing, Samir Mekid, 2021 Theory and Design for Mechanical Measurements, 7th Edition, Richard S. Figliola, Donald E. Beasley, 2019 Metrology in Industry: The Key for Quality, French College of Metrology, Dominique Placko (Series Editor), 2013
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. **Exams (40% Mid-Term, 40% Final):** All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions.
Contact	

Subject	**Laboratory 2**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatory (M)	3	3	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	During the course students will apply practical aspects of mechatronics by using components like motors, sensors, and digital circuits. Then we move to combining components thus creating more complex circuits and implementing them for solving real life problems. By the end, students will be able to analyze and know how to choose motors, sensors and different components based on problems they are solving.			
Learning Outcomes	Upon successful completion of the course, students will be able to: • Be able to apply and use DC, Servo and Stepper Motors • Be able to apply and use in practice different sensors (analog and digital) and development boards • Analyze the problem and its requirements, and create a solution using mechatronics components			

Recommended prerequisites:	• Laboratory 1 • Computer Science 1
Course Content (for 15 weeks)	DC Motors (Practical application) • Driver development • Control of speed and direction of motor Servo Motors (Practical application) • Driver development • Control of position Stepper Motors (Practical application) • Application of different type of stepper motor drivers • Control of speed, position and direction of motor Sensors (Practical application) • Application of digital and analog sensors • Combination of sensors with mentioned motors Digital Circuits • Application of digital circuits with motors and sensors Microcontrollers • Arduino Development Board • Raspberry Pi Board • ESP32 Board

Teaching/Learning Methods	**Teaching/Learning Activity**	**Weight (%)**
	1. Lectures	20%
	2. Exercises	40%
	3. Case studies	20%
	4. Problem-based learning	20%

Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	1. Group exercises	4		60%
	2. Final exam	1		40%

Course resources	**Resources**	**Number**
	1. Laboratory	1
	2. Moodle	1

	3. Projector		1
	4. Electronic components		1
ECTS Workload	**Activity**	**Weekly hrs**	**Total workload**
	1. Lectures	1	15
	2. Exercises	3	45
	3. Self-Learning		28
	4. Exams	1	2
Literature/References	Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, 2019, William Bolton, ISBN-10: 9353065887 Mechatronic Systems, Sensors, and Actuators Fundamentals and Modeling By Robert H. Bishop · 2017 Laboratory working manuals Internet resources in subjects related to Mechatronics.		
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.		
Contact			

Subject	**Digital Circuits and Signals**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatory (O)	3	5	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	Circuits and signals are foundational concepts for computer engineering. These areas provide the fundamental knowledge for the design of the circuits used to implement computers. A knowledge of electrical circuits used to implement digital circuits and computers will include Combinational and Sequential logic circuits. Key topics include Binary arithmetic, Boolean Algebra, Combinational Logic Circuits, arithmetic circuit's, sequential circuits, asynchronous counters, Registers.			
Learning Outcomes	Upon successful completion of the course, the student is expected to: ● Understand the operation principles of computer circuits ● Design / Implement digital combinational logic circuits ● Design / Implement digital Sequential logic circuits			

	• Understand the principles of computer circuits • Understand the sequential circuits and memory structure.			
Course Content for 15 weeks	**Course Plan**			
	Introduction Binary Arithmetic Complementary Arithmetic and Codes Boolean Algebra Karnaough Maps Combinational Logic Circuits, analysis – design Decoders, Encoders, Multiplexers MUX, Demultiplexers DEMUX Indicators, Comparators, Code Converters Parity Generators, Arithmetic Circuits Sequential Circuits, Flip-Flops Synchronous Sequential Circuits Asynchronous Sequential Circuits Counters Registers			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			50%
	• Seminars			-
	• Laboratory			30%
	• Case studies			-
	• Role play			-
	• Problem-based learning			20%
	• Study visits			-
	• Work placement			-
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	-	-	-
	• Laboratory projects	-	-	40%
	• Midterm	-	-	-
	• Final Exam	1	-	60%
Course resources	**Resources**			**Number**

	• Classroom(e.g)		1
	• Laboratory (e.g)		1
	• Moodle		1
	• Softwer		-
	• Projector		1
ECTS Workload	**Activity**	**Weekly hrs**	**Total workload**
	• Lectures	2	30
	• Seminars		-
	• Laboratory		15
	• Assignments	-	20
	• Independent Study	-	83
	• Exam	-	2
Literature/References	Dale R. Patrick, Stephen W. Fardo et.al., Electronic Digital System Fundamentals, (2023). A. Anand Kumar (2016), Fundamentals of Digital Circuits, Prentice Hall. Agni Dika, Qarqet Kompjuterike Kombinuese 1		
Ethical Standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. **Exams (60% Final)**: All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions. **Laboratory Project (40%)**: Laboratory project must reflect the student's own independent work in laboratory.		
Contact			

Subject	**Fluid and Thermodynamics**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatory (M)	3	5	
Lecturer **Course Assistant**				
Aims and Objectives	The course Fluid and Thermodynamics is designed to provide students with a comprehensive understanding of the fundamental principles governing fluid mechanics and thermodynamics. It focuses on developing the ability to analyze and solve engineering problems related to fluid flow, energy conservation, and thermodynamic systems. By exploring topics such as fluid statics, kinematics, viscous flow, and the laws of thermodynamics, students will gain the knowledge and skills necessary to evaluate and optimize processes and cycles. This course also emphasizes practical application, preparing students to apply these principles to real-world engineering challenges effectively.			
Learning Outcomes	Upon completion of this course the student will be able to: • Understand and explain key concepts of fluid mechanics and thermodynamics. • Describe the laws of thermodynamics and their applications. • Identify properties of gases and vapors in processes and cycles. • Solve problems in fluid mechanics, including flow and statics. • Evaluate thermodynamic systems for efficiency and performance.			
Content	**Weekly plans for 15 weeks** Fundamental Concepts Fluid Statics Kinematics of Fluid Motion Conservation of Mass Work and Energy of Moving Fluids Differential Fluid Flow Viscous Flow within Enclosed Conduits Basic concepts of thermodynamics The body of work. Properties of gases and vapors The first law of thermodynamics The second law of thermodynamics Entropy. Exergy Analysis of processes and cycles			
				(%)
	• Interactive lectures			50
	• Project			20

Teaching/Learning Methods	• Consultations			10
	• Laboratory/ Software			20
Assessment Methods	**Evaluation activity**	**Number**	**Week**	**(%)**
	- Lectures attendance and exercises			5
	- Activity during lecturing and exercising			5
	- Project			15
	- Colloquia I	1	8	20
	- Colloquia II	1	15	20
	- Final exam	2	1-15	35
Course resources	**Means**			**Number**
	• Class			1
	• Computer			1
	• Moodle			1
	• Laboratory			1
ECTS Workload	**Activity type**		**Weekly hours**	**Total Load**
	• Lectures		2	30
	• Numerical and Laboratory Exercises		1	15
	• Consultations			15
	• - Colloquia			4
	• Independent learning, seminar			51
	• Exam		1	2
Literature/References	• Fluid Mechanics. R. C. Hibbeler - 3rd edition 2022 • Termoteknika. I. Demneri, A. Shtjefeni. R. Karapeci, 2007 • Mekanika e Fluideve. J. Bunjaku • Thermodynamics, An engineering approach. Y. Cengel, M. Boles –ninth edition 2019 • Fizika Statistike dhe Termodinamika. H.Kamberaj- 2014 • Heat and Mass Transfer. Yunus Cengel- 6th edition 2019			

Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. **Exams (40% Mid-Term, 30% Final):** All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions. **Case Study Analysis (20%):** Case study analyses must reflect the student's own independent work. Collaboration, if permitted, must be properly cited. Plagiarism in case study submissions will be monitored using Turnitin. The similarity index must be below 15% for Bachelor's level and below 10% for Master's level (excluding references, quotes, and small sources).
Contact	

Subject	**Information technology**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatory (M)	3	5	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	**The purpose of this course is to provide students with general knowledge about:** ● Fundamentals of Information technology and areas of application of Information technology; ● Differences between Information, signal and data; ● Types of information and data transmission; ● Local area networks and equipment used for data transmission and routing ● Types of data transmission media; ● Types of multiplexing; ● Internet, OSI / TCP model and Internet protocols ● Optical networks and their standards (SONET and SDH).			
Learning Outcomes	**At the end of this module the student will be able to:** ● **Develop practical skills** in managing computer systems by installing, configuring, and maintaining hardware and software components to ensure system reliability and security. ● **Apply problem-solving techniques** to troubleshoot and resolve technical issues related to networks, operating systems, and software applications effectively. ● **Applying techniques** for configuring network devices to optimize communication, based on communication protocols and models. ● **Demonstrate skills** in the use of information technology, problem solving during its application, and the use of presentation programs to produce professional documents and presentations. ● **Collaborate in team environments** to design and implement small-scale IT projects**,** such as setting up a network or automating a process, using knowledge gained about transmission media, multiplexing methods, and information modulations. ● **Evaluate and select appropriate IT tools and technologies** to optimize workflows, manage data securely, and support decision-making processes in organizational contexts.			
Course Content for 15 weeks	**Course Plan** Introduction to the basics of information technology; Areas of application of information technology. Information technology equipment.			

Information transmission: Model of a telecommunication system; The difference between information, signal and data; Types of signals for information transmission; Ways of transmitting information. Types of data transmission; Serial and parallel transmission; Channel capacity. Asynchronous and synchronous transmission.

Local Area Networks and Network Equipment: Local Area Networks; Repeater, HUB; Bridge; Switch; Router; Gateway; Modem; WAP-Wireless Access Point; Firewall.

Types of media for data transfer: Open media; Electromagnetic waves; Antenna; Closed transmission media (UTP; STP; Coaxial cable), Optical fibers and their types (Single-mode optical fibers; Multimode optical fibers; Disadvantages and advantages of single-mode and multimode optical fibers; Scale-index optical fibers; Gradual index optical fibers).

Types of multiplexers: Multiplexing and demultiplexing; Frequency division multiplexing - FDM; Time division multiplexing - TDM; Synchronous time division multiplexing - STDM; STDM (statistical time division multiplexing); Wavelength division multiplexing (WDM), Coarse Wavelength Division Multiplexing (CWDM); Dense wavelength division multiplexing (DWDM), Modulation types (ASK, FSK and PSK).

Internet Network: What is Internet; OSI / TCP models; Communication protocols **(**Transmission Control Protocol (TCP), Internet Protocol (IP), User Datagram Protocol (UDP), Post office Protocol (POP), Simple mail transport Protocol (SMTP), File Transfer Protocol (FTP), Hyper Text Transfer Protocol (HTTP), Hyper Text Transfer Protocol Secure (HTTPS), Telnet**,** ARP (Address Resolution Protocol), DHCP (Dynamic Host Configuration Protocol), IMAP4 (Internet Message Access Protocol), SIP (Session Initiation Protocol), RTP (Real-Time Transport Protocol), RLP (Resource Location Protocol), RAP (Route Access Protocol), L2TP (Layer Two Tunnelling Protocol), PPTP (Point to Point Tunnelling Protocol), SNMP (Simple Network Management Protocol), TFTP (Trivial File Transfer Protocol).

WAN (Wide Area Networks) Network Types: Ethernet (Ethernet Technologies; 10-Mbps Ethernet; 100-Mbps Ethernet; 1000-Mbps Ethernet; 10-Gbps Ethernet); Circuit switching network; Digital network with packet switching. Optical networks and their standards (SONET and SDH).

Technologies: DSL, ADSL; ADSL+; VHDSL.

Teaching/Learning Methods

Teaching/Learning Activity	Weight (%)
1. Lectures	50%
2. Seminars	10%
3. Numerical Exercises	30%
4. Role play	-
5. Problem-based learning	10%
6. Study visits	-
7. Work placement	-

Assessment Methods

Assessment Activity	Number	Week	Weight (%)
• Quiz	10	2-11	15%
• Group work/homework			0%
• Mid-term exam		7	40%
• Final exam			45%

Course resources

Resources	Number
• Class (e.g)	1
• Laboratory (e.g)	1
• Moodle	1
• Projector	1

	•		
ECTS Workload	**Activity**	**Weekly hrs**	**Total workload**
	• Lectures	2	30
	• Numerical Exercises	1	15
	• Laboratory		
	• Practice in the industry		
	• Independent learning		100
	• Exams		5
Literature/References	**Proposed literature and other resources:** ● Students will be offered literature in Albanian language (script prepared for this course). ● Jill West. **Network + Guide to Networks**, Ninth Edition, 2022. ● Brian K. Williams, Stacey C. Sawyer. Using information technology: a practical introduction to computers & communications: Complete version. 11th edition, 2015.		
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. `		
Contact			

Subject	**Law and Ethics in Engineering**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatory (M)	3	3	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	This course discusses ethical issues in the practice of engineering and science. Code of ethics for engineers, professional liability to clients, employers, and society, distinction of responsibility and accountability, legal obligations, and regulatory areas of concern to engineers, such as labour, safety and the environment, are among the topics examined. Case studies will be analysed to understand concrete problems and their consequences			
Learning Outcomes	Upon successful completion of the course, students will be able to; • Apply ethical principles and legal frameworks to engineering practices, including conflict resolution and social responsibility. • Evaluate the impact of intellectual property infringement in professional and technological contexts. • Identify ethical challenges in organizational settings and propose solutions based on ethical behavior models. • Understand preventive measures and reporting methods for cybercrime in engineering.			
Course Content for 15	- Introduction to the subject, basic notions and principles of law and ethics in engineering			

weeks	-Ethics as science, notions, theory, principles and purpose of ethics -Ethics at work, its role and importance; -Morality and ethics, ethics and social responsibility; -Ethics and conflict of interest, prevention and resolution -Ethical Issues in Engineering Practice -The Rights and Responsibilities of Engineers -Business law, practical and organizational ethics, internal organizational influences, organizational culture; -Model of ethical behaviour in the workplace; Atmosphere of socio-psychological work; -Ethics, integrity and normative ethics -Intellectual property -Problems caused as a result of infringement of intellectual property -Crimes which are caused through the use of technology -Informatics and Cybercrime -Forms of reporting cybercrime -Preventive Masses
Teaching/Learning Methods	**Teaching/Learning Activity** — **Weight (%)** • Lectures — 40% • Essays — 20% • Problem-based learning — 20% • Homework — 20%
Assessment Methods	**Assessment Activity** — **Number** — **Week** — **Weight (%)** • Homework — 20% • Essays — 20% • Class Participation — 10% • Final exam — 50%
Course resources	**Resources** — **Number** • Class (e.g) — 1 • Laboratory (e.g) • Moodle — 1 • PC — 1 • Projector — 1
ECTS Workload	**Activity** — **Weekly hrs** — **Total workload**

	• Lectures	2	30
	• Project Seminar		15
	• Self-Study		73
	• Exams		2
Literature/References	Tavani, Herman T. (2015). Ethics and Technology: Controversies, Questions, and Strategies for Ethical Computing (5th Edition). Wiley. ISBN: 9781119239758 Reynolds, George. (2018). Ethics in Information Technology (6th Edition). Cengage Learning. ISBN: 9781337405874 Mike W. Martin & Roland Schinzinger (2010). *Ethics in Engineering* (4th Edition). McGraw-Hill.		
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.		
Contact			

<table>
<tr><td>Subject</td><td>Production Automation
<table><tr><th>Type</th><th>Semester</th><th>ECTS</th><th>Code</th></tr><tr><td>Mandatory (M)</td><td>4</td><td>5</td><td></td></tr></table></td></tr>
<tr><td>Course Lecturer
Course Assistant
Course Tutor</td><td></td></tr>
<tr><td>Pre-requisite courses</td><td>Digital Circuits and Signals</td></tr>
<tr><td>Aims and Objectives</td><td>The course is designed to introduce production automation. The students will be able to choose the appropriate software tools for their application. They get familiar with the types of interface signals of industrial automation systems, especially PLCs, which are the standard automation devices in the industry. With the knowledge about how PLCs communicate with their periphery or with each other respectively they can decide about the usability of industrial communication systems.</td></tr>
<tr><td>Learning Outcomes</td><td>Upon successful completion of this course, students will be able to:
Clearly explain the automated production systems
Implement PLC software for automation solutions
Understand Industrial communication tools and instruments
Clearly explain complex industrial communication systems.</td></tr>
<tr><td>Course Content for 15 weeks</td><td>Course Plan
Introduction
Pneumatic Components
Pneumatic Circuits
Electrical Systems
Electrical Control Circuits
Industrial Sensors
Programmable Logic Controllers (PLC)
PLC Hardware
PLC Programming
Ladder Logic Programming
Digital I/O Modules Programming
Analog I/O modules Programming
Communications Module Programming
Industrial Communication tools and Instruments
Industrial Communication Systems</td></tr>
</table>

Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			70%
	• Numerical Exercises			-
	• Laboratory			30%
	• Case studies			-
	• Role play			-
	• Problem-based learning			-
	• Study visits			-
	• Work placement			-
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	-		-
	• Laboratory Projects	-	-	40%
	• Midterm	-	-	-
	• Final Exam	1	-	60%
Course resources	**Resources**			**Number**
	• Classroom(e.g)			1
	• Laboratory (e.g)			1
	• Moodle			1
	• Software			-
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	30
	• Numerical Exercises		-	-
	• Laboratory		1	15
	• Assignments		-	15
	• Independent Study			88
	• Exam		-	2
Ethical Standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. **Exams (60% Final)**: All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any			

	form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions. **Laboratory Project (40%)**: Laboratory project must reflect the student's own independent work in laboratory.
Literature/References	Gupta A.K., Arora S.K., Westcott J.R.,"Industrial Automation and Robotics", second edition (2023) Mehta B.R., Reddy Y.J., "Industrial Process Automation Systems" (2014), Butterworth-Heinemann.
Contact	

Subject	**Modelling and Simulation**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatory (M)	4	5	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	The course is concerned with a basic understanding of simulation methods. The study includes problem specification, mathematical modelling, simulator implementation, model validation, problem solution, and presentation of results. It is discussed with a simple representative example. Some typical simulation tools for different scientific disciplines (mechanical multibody systems, electrical circuits, control engineering) are roughly introduced. One focus is placed on methods for numerical integration of time continuous systems which are described by ordinary differential equations or time dependent equation systems. Working with the corresponding simulation tools requires a more detailed understanding of the involved numerical algorithms.			
Learning Outcomes	Upon successful completion of the course, the student is expected to: • Apply fundamental concepts of dynamic systems, including classification, modeling principles, and simulation techniques, to solve engineering problems and improve system performance. • Demonstrate the ability to develop mathematical models for mechanical, electrical, electromechanical, and fluid systems, considering both linear and nonlinear aspects. • Utilize appropriate simulation tools to perform numerical simulations of dynamic systems, employing relevant numerical methods for analysis • Conduct time domain analysis for dynamic systems, interpret time responses, and evaluate system performance based on time-domain specifications and measures.			
Course Content for 15 weeks	**Course Content** Introduction; Definition and classification of dynamic systems Importance of modelling in engineering and Overview of simulation techniques Fundamentals of numerical mathematics for simulation Approaches to modelling and simulation Simulation software packages Models and modelling of technical systems Modelling and Simulation of Electrical Systems			

	Modelling and Simulation of Fluid and Thermal Systems Modelling and Simulation of Mechanical Systems Numerical simulation techniques and Validation and verification of simulation models Case studies in time domain analysis			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			30%
	• Laboratory			30%
	• Case studies			20%
	• Problem-based learning			20%
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Class activity			20%
	• Final Exam	1	-	80%
Course resources	**Resources**			**Number**
	• Classroom			1
	• IT Laboratory			1
	• Moodle			1
	• Software MATLAB/ Python			1
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	30
	• Laboratory		1	15
	• Independent Study			88
	• Projects			20
	• Exam			2
Literature/References	Modeling and Simulation in Python An Introduction for Scientists and Engineers By Allen B. Downey · 2023 Introduction to Modeling and Simulation with MATLAB (R) and Python, By Steven I.. Gordon, Brian Guilfoos · 2020 Lecture notes, manuals, textbook, simulation tools (MATLAB) A. Law “Simulation Modelling and Analysis” McGraw Hill Higher Education; 4th edition (August 1, 2006) John A. Sokolowski (Editor), Catherine M. Banks “Principles of Modelling and Simulation: A Multidisciplinary Approach” Wiley; 1 edition (February 9, 2009)			
Ethical standards	-This course follows UBT College’s Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any			

	form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. -All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions.
Contact	

Subject	**Control Engineering**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatory (O)	4	5	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	This course introduces the fundamental concepts of control engineering systems and provides an overview of automation systems with special emphasis upon process automation in an industrial context. On completion of this module participants will: know the most important principles and methods of automation know the usual tools and devices, be able to make informed decisions about an automation solution, be able to plan and realize automation solutions.			
Learning Outcomes	On completion of this module participants will: ● Apply control system principles to model, analyze, and design closed-loop systems for engineering applications. ● Develop and utilize Laplace transform methods to derive transfer functions and analyze system responses in the time domain. ● Design and tune controllers such as PI, PD, and PID to achieve desired performance specifications in control systems. ● Evaluate system stability using techniques like Routh-Hurwitz, Root Locus, and Bode Diagram methods. ● Implement state-space methods to design and optimize control systems for complex engineering applications.			
Recommended prerequisites:	Course: ● Mathematics I and II, ● Fundamental of Mechanical Engineering ● Fundamental Electrical and Electronics Engineering ● Instrumentation and Measurement			
Course Content for 15 weeks	**Course Content** Introduction Control System Fundamentals System Modelling Laplace Transform Time domain analysis, transfer functions			

	Closed Loop Control Systems Controllers (PI, PD, PID) Stability Analysis, Routh-Hurwitz Stability Criterion Root Locus Frequency Domain Analysis Bode Diagram State Space Methods for Control System Design			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			40%
	• Seminars			10%
	• Case studies			10%
	• Exercises			40%
	• Study visits			
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Final Exam	1	-	70%
	• Individual Projects	1	-	20%
	• Attendance/Participation			10%
Course resources	**Resources**			**Number**
	• Classroom (e.g)			1
	• Laboratory (e.g)			1
	• Moodle			1
	• Software MATLAB-SIMULINK/LabView/Python			1
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	30
	• Exercises		2	30
	• Individual project			20
	• Exam preparation			67
	• Exams			3

Literature/References	Control Systems Engineering, 8th Edition, by Norman S. Nise (Author), 2019 Roland S. Burns (2001), "Advanced Control Engineering", ISBN: 0750651008 Feedback control of dynamic systems Book by Gene F. Franklin *(UBT Library)* Further Readings Automatic Control Systems by George J. Thaler (UBT Library) Modern Control Systems (Electrical Engineering S.) by Richard C. Dorf (UBT Library) Hydraulic Control Systems, by Herbert E. Merritt (Author) (UBT Library)
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. Exams: All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions.
Contact	

Subject	**Laboratory 3**			
	Type	**Semester**	**ECTS**	**Code**
	OBLIGATORY (O)	4	3	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	During the course, students will apply practical aspects of control engineering. In the beginning, students will implement first and second-order systems and analyze their step and natural response. Then we will move gradually to developing more complex configurations like summing, differential, integrator, and differentiator amplifiers following by sensor interfacing and feedback circuits. By the end students will learn how to analyze and develop control systems for different practical applications.			
Learning Outcomes	Upon successful completion of the course, students will be able to: • Be able to analyse step and natural responses of first and second order systems • Show competences and develop practical applications of first and second order systems, summing, differential, integrator and differentiator configuration of amplifiers • Apply in practice control systems for different projects			
Recommended prerequisites:	• Laboratory 1 • Laboratory 2 • Introduction to Mechatronics			
Course Content (for 15 weeks)	Step and natural response of first order systems			

	Step and natural response of second order systems Summing and differential amplifiers Integrator and differentiator amplifiers Sensor interfacing Feedback circuits PID control

	Teaching/Learning Activity	**Weight (%)**
Teaching/Learning Methods	• Lectures	20%
	• Exercises	40%
	• Case studies	20%
	• Problem-based learning	20%

	Assessment Activity	**Number**	**Week**	**Weight (%)**
Assessment Methods	• Group exercises	7		70%
	• Final exam	1		30%

	Resources	**Number**
Course resources	• Laboratory	1
	• Moodle	1
	• Projector	1
	• Electronic components	1

	Activity	**Weekly hrs**	**Total workload**
ECTS Workload	• Lectures	1	15
	• Exercises	3	45
	• Self-Learning		28
	• Exams		2

Literature/References	Modern Control Systems, Global Edition 14th Edition, Richard Dorf, Robert Bishop, 2021, ISBN-10: 1292422378 Nise, Norman S. Control Systems Engineering. 2019. ISBN-10 : 1119590132

	Feedback control of dynamic systems Book by Gene F. Franklin (UBT Library) Automatic Control Systems by George J. Thaler (UBT Library) Modern Control Systems (Electrical Engineering S.) by Richard C. Dorf (UBT Library) Hydraulic Control Systems, by Herbert E. Merritt (Author) (UBT Library)
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.
Contact	

Subject	**Software Systems Engineering**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatory (M)	4	5	
Course Lecturer **Course Assistants**				
Aims and Objectives	The objective of this is to provide students with competences and practical skills in the field of software engineering. The course Software System Engineering deals with methods and techniques for asking the right questions to the client, making the client requests applicable in a software application, and learn the main features of designing and managing software projects. The student will face engineering and management problems from all areas of software engineering. They will understand that: • how computer programs are specified in large organizations, • how they can provide sound architecture programs, • which programming languages and platforms are used to implement software, • how is the ability acquired and managed, • what are the challenges of program life over decades, • how to turn the idea into a software program, and • how to operate in an industrial development context.			
Enrolment/Prerequisite(s):	Fundamentals of Computer Science			

Learning Outcomes	• Develop technical skills and competence in applying software engineering concepts and processes across all stages of the software development lifecycle. • Analyze engineering requirements to model systems, design software architecture, and create object-oriented models and tactical solutions. • Gain competence in using modeling tools and techniques, including the Unified Modeling Language (UML), to document and implement software systems effectively. • Acquire the ability to evaluate and analyze problems, estimate time and cost, and propose solutions for complex software engineering projects. • Enhance communication and collaborative skills to interact effectively with clients, stakeholders, and team members in major software development projects.
15 Weeks Course Content	**Content** Introduction to syllabus, Introduction to software engineering Feasibility Analysis in Software projects Software Processes and Models (SDLC) Agile Software Development - Agile Process Requirement Engineering - Requirement Analysis Requirement Engineering - Requirement Derivation UML - Unified language for designing software systems Requirement Design (UML) -1 Requirement Design (UML) -2 Software Architecture Design Design GUI Software Testing and Evolution Embedded Systems
Teaching/Learning Methods	**Teaching/Learning Activity** — **Weight (%)** • Lectures — 30% • Project — 30% • Laboratory — 20% • Independent study — 20%
Assessment Methods	**Assessment Activity** — **Number** — **Week** — **Weight (%)**

	• Group Project	1	14	30%
	• Assignments	4	3,5,7,9,11	20%
	• Final Exam	1	15	50%

Course resources	**Resources**	**Number**
	• Class	1
	• Lab	1
	• Moodle	1
	• UML	1

ECTS Workload	**Activity**	**Weekly hrs**	**Total workload**
	• Lecture	2	30
	• Lab Work	2	30
	• Assignement	2	10
	• Independent study	5	60
	• Project	4	20

Literature/References	Requirements Engineering for Software and Systems (Applied Software Engineering Series) 4th Edition, Phillip A. Laplante, Mohamad H. Kassab, 2022 Software Engineering for Embedded Systems: Methods, Practical Techniques, and Applications 2nd Edition, Robert Oshana, Mark Kraeling, 2019
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.
Contact	

Subject	**CAD/CAM**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatory (M)	4	5	
Course Lecturer **Course Assistant**				
Prerequisite	Engineering Graphics and CAD			
Goals and Objectives	Through this course, students will be equipped with knowledge and skills related to CAD/CAM. Specifically, the notions will be elaborated separately starting with fundamentals of CAD/CAM, different techniques of geometric modelling, and aspects related to computer aided manufacturing. The goal of this course is to provide students with scientific and engineering knowledge in the relevant field, including theoretical and practical expertise. Based on this goal, the objectives are that every student can apply and understand CAD/CAM alongside the requirements, provide strong understanding of modelling techniques and apply the computer for manufacturing applications.			
Learning Outcomes	Upon completion of this course, students will be able to: • Apply fundamental concepts of CAD/CAM to solve engineering problems and enhance design and manufacturing processes • Distinguish and explain CAD/CAM systems • Executes objects using different modelling techniques • Apply CAD/CAM for NC programming • Uses computer for implementation for manufacturing			
Course Content	The course plan for 15 weeks will be as follows: Notification and organization of the course; Fundamentals of CAD/CAM; Stages in design process with CAD; Geometric models I; Parametric curves; Geometric models II; Solid and assembly models; Graphics standards; ; Fundamentals of CAM; Numerical control; NC part programming; Process planning; Computer integrated manufacturing;			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			30%
	• Examples			20%
	• Exercises			20%
	• Case studies			10%
	• Role simulation			10%
	• Problem solving			10%
Assessment Methods	**Assessment Activity**		**Week**	**Weight (%)**
	• Participation		15	10%
	• Activity in lecture		15	10%
	• Exam		15	80%
Course resources	**Resources**			**Number**
	• Class			1
	• Moodle			1
	• Software			1
	• Projector			1
	• PC or Laptop			1

	Activity	Weekly hrs	Total workload
ECTS Workload	• Lectures	1	30
	• Examples		55
	• Exercises	2	15
	• Independent learning		50
Literature/References	Basic literature: • Sathyabama Institute of Science and Technology. CAD/CAM. School of Mechanical Engineering Additional literature: • M. Adithan and B.S. Pable. (2018). CNC Machines, 3 Edition, New Age International Publishers. • M. Groover and E. Zimmers. (2003). CAD/CAM Computer-Aided Design and Manufacturing, 1 Edition, Pearson Education. • Ibrahim Zeid and R. Sivasubramanian. (2009). CAD/CAM: Theory and Practice, 2 Edition, McGraw Hill Education. • Mike P. Groover. (2014). Automation, Production Systems and Computer Integrated Manufacturing, 4 Edition, Pearson Education.		
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including exam, activity in lectures and participation. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.		
Contact			

Subject	**Entrepreneurship and Innovation**			
	Type	**Semester**	**ECTS**	**Code**
	Elective	4	3	
Course Lecturer				
Aims and Objectives	This course equips students with the skills and competences to design, implement, and manage innovative business models, preparing them to excel in entrepreneurial activities within competitive markets. Students will develop practical skills in generating business ideas, analyzing market conditions, and applying advanced business strategies. Through workshops and case studies, students will explore successful business models from Kosovo and around the globe, fostering their competence in addressing real-world challenges and presenting innovative solutions effectively.			
Learning Outcomes	• Generate and implement innovative business ideas by applying entrepreneurial concepts to design advanced business models tailored to competitive market environments. • Develop problem-solving skills to address challenges in transitioning business sectors or enterprises, with a focus on creating sustainable solutions. • Demonstrate competence in managing and leading entrepreneurial ventures across key business functions such as sales, production, finance, marketing, human resources, and technology development.			
Course Content for 15 weeks	Basic Concepts of Entrepreneurship Business environment Business and Entrepreneurship			

	Analysis of the macro idea and micro filter SWOT and SMART Business idea analysis. Workshop based business plan Market and competition analysis (Porter 5 forces) Marketing Plan. Initial capital sources for financing Business Costs Financial plan Cash flow and break event point Financial Projections

Teaching/Learning Methods	**Teaching/Learning Activity**	**Weight (%)**
	Lectures	20%
	Exercises	20%
	Case studies	40%
	Role play	10%
	Working groups	10%

Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Test	2	7,15	50%
	• BP based learning	1	1-15	40%
	• Activity in working groups	1	1-15	10%

Course resources	**Resources**	**Number**
	• Classes (e.g)	1
	• Lectures and materials posted on Moodle	1
	• Projector	1

ECTS Workload	**Activity**	**Weekly hrs**	**Total workload**
	• Lectures	2	30
	• Exercises	1	15
	• Project preparation		20
	• Independent study		23
	• Final exam		2

Literature/References	Startup Program Design: A Practical Guide for Creating Accelerators and Incubators at Any Organisation, Paolo Lombardi and Adam Berk, 2022 Recent Trends in Entrepreneurship & Innovation Edited by Dr. Parul Sharda, Dr. Reena Gupta, and Dr. Ankita Jain, 2023
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.
Contact	

Subject	**Human Resource Management**			
	Type	**Semester**	**ECTS**	**Code**
	Elective (E)	4	3	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	This course equips students with skills and competences to effectively manage human resource functions and address HR challenges within organizational contexts. Students will gain practical skills in staffing, performance management, compensation, and strategic HR planning. The course focuses on analyzing real-life business problems, enabling students to develop competence in applying contemporary HR practices and techniques. Additionally, students will be prepared to address emerging HR issues and implement strategies for effective workforce management and organizational success.			
Learning Outcomes	• Implement HR strategies and techniques for staffing, performance management, and compensation to enhance organizational effectiveness. • Develop problem-solving skills to analyze HR-related challenges and design strategic solutions for workforce planning and development. • Demonstrate competence in integrating HR concepts into decision-making processes to align human resource practices with organizational goals.			
Course Content for 15 weeks	Topics to be covered: • Introduction and Background of Human Resource Management: Nature, Definition and Challenges • Understanding the External and Organizational Environments • Job Analysis and Design • Human Resource Planning • Recruiting Employees • Selecting Employees Orientation and Employees Training • Management and Organizational Development • The Organizational Reward System • Career Development • Employee Safety and Health • International Human Resource Management			
	Teaching/Learning Activity			**Weight (%)**

Teaching/Learning Methods	• Lectures			40%
	• Projects			20%
	• Numerical Exercises			20%
	• Problem-based learning			20%
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	2	2	20%
	• Projects			30%
	• Mid-term exam	1	7	20%
	• Final exam			30%
Course resources	**Resources**			**Number**
	• Class (e.g)			1
	• Laboratory (e.g)			
	• Moodle			1
	• Software			1
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	30
	• Exercises		1	15
	• Project Seminar			20
	• Practice in the industry			2
	• Independent learning			42
	• Exams			5
Literature/References	Human Resource Management: Functions, Applications, and Skill Development Fourth Edition, Robert N. Lussier, John R. Hendon, 2021 K Aswathappa, “Human Resource and Personal Management” (2017) Tata McGraw Hill, 8th Edition Other material that is distributed during the course or published on the course's website (MOODLE)			

Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.
Contact	

Subject	**Supply Chain Management**			
	Type	**Semester**	**ECTS**	**Code**
	ELECTIVE (E)	4	3	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	This course equips students with the skills and competences to effectively implement and manage supply chain processes across organizational boundaries and within networks of firms. It emphasizes strategic integration of supply chain functions, focusing on managerial challenges and practical solutions. Students will develop competences in areas such as supply chain strategy, inventory management, transportation and distribution, network design, and performance measurement. The course also covers supply chain coordination, incentive management, and the application of technology in e-business and digital supply chains, preparing students to address real-world challenges in designing and optimizing efficient and responsive supply chains.			
Learning Outcomes	• Implement integrated supply chain strategies by designing logistics systems, optimizing inventory management, and coordinating transportation and distribution to enhance supply chain efficiency. • Develop competences in utilizing technology and data exchange to create responsive and digitally integrated supply chains, addressing global and industry-specific challenges. • Demonstrate problem-solving skills in overcoming barriers to the implementation of supply chain strategies, particularly in uncertain environments, while quantifying performance improvements.			
Course Content **for 15 weeks**	**Course Plan**			**Week**
	Introduction to Supply Chain Management and Supply Chain Strategy Supply Chain Performance Metrics Supply Chain and Network Design Global Supply Chain Networks Operations management and sales planning Inventory management Transportation in SC			

	Logistics and procurement Mid-term exam IT in SCM Digital technologies and SCM Case studies in SCM Financial management: Time Value of money Case Studies / Problems and solutions in Economics Final exam			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			60%
	• Seminars			15%
	• Practice			0%
	• Case studies			10%
	• Role play			-
	• Problem-based learning			15%
	• Study visits			-
	• Work placement			-
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	2	5,,11	10%
	• Group work/project	1		25%
	• Mid-term exam	1		15%
	• Final exam	1		50%
Course resources	**Resources**			**Number**
	• Class (e.g)			1
	• Laboratory (e.g)			1
	• Moodle			1
	• Softueri MATLAB/SPSS/Python			1
	• Projector			
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**

	• Lectures	2	30
	• Seminars	1.5	20
	• Laboratory		
	• Practice in the industry		2
	• Independent learning		34
	• Exams		4
Literature/References	Blanchard, D. (2021) Supply Chain management best practices. Wiley. Sweeney, E. and Waters, D. (2021) Global Logistics: New directions in supply chain management. Kogan page Josef Packowski (2013) LEAN Supply Chain Planning The New Supply Chain Management Paradigm for Process Industries to Master Today's VUCA World. CRC Press, Boca Raton.		
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.		
Contact			

Subject	**Marketing**			
	Type	**Semester**	**ECTS**	**Code**
	Elective (E)	4	3	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	This course is designed to equip students with the skills and competences to effectively implement marketing principles and manage marketing activities within organizational contexts. Students will develop practical skills in conducting environmental, industry, and competitor analyses, designing and implementing marketing strategies, and managing the marketing mix components, including pricing, distribution, product and service development, and promotional strategies. The course emphasizes the integration of traditional and digital marketing communication techniques, providing opportunities for real-world application through seminars, tutorials, and problem-solving exercises. Students will also build competence in aligning marketing activities with organizational goals and managing exchange processes between business units, consumers, and firms.			
Learning Outcomes	• Implement marketing strategies by analyzing market environments, identifying customer segments, and designing customer-centric approaches, including branding and pricing strategies. • Develop practical skills to create comprehensive marketing plans, integrating traditional and digital marketing tools and aligning them with organizational goals and market demands. • Demonstrate competence in managing marketing activities, including segmentation, targeting, and positioning, while addressing challenges in diverse consumer and business markets.			
Course Content for 15 weeks	Topics to be covered: • What is Marketing • Segmentation and Targeting • Differentiation and Positioning • Marketing Strategy – I: Product and Price			

	• Marketing Strategy – II: Place and Promotion • Digital Marketing			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			40%
	• Projects Seminar			20%
	• Problem-based learning			20%
	• Exercises			20%
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	2	2	20%
	• Projects			30%
	• Mid-term exam	1	7	20%
	• Final exam			30%
Course resources	**Resources**			**Number**
	• Class (e.g)			1
	• Laboratory (e.g)			
	• Moodle			1
	• Software			1
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	30
	• Exercises		1	15
	• Project Seminar			20
	• Practice in the industry			2
	• Independent learning			21
	• Exams			2

Literature/References	Kotler, P., & Keller, K.L., (2016), Marketing Management. 15th ed. Harlow: Pearson Marketing Management, Global Edition 16th Edition, Philip Kotler, Kevin Keller, 2021
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.
Contact	

Subject	**Artificial Intelligence**			
	Type	**Semester**	**ECTS**	**Code**
	OBLIGATIVE (O)	5	5	
Course Lecturer				
Pre-requsite	Mathematics			
Course Assistant **Course Tutor**				
Aims and Objectives	This course aims at providing the fundamentals of Artificial Intelligence and their applications. The topics covered include: expert systems, artificial neural networks, fuzzy systems, genetic algorithms and their applications.			
Learning Outcomes	Upon successful completion of the course, the student is expected to: ● Understand/Define the fundamentals of Artificial Intelligence and techniques used in AI ● Apply AI techniques for solving problems in the field of mechatronics engineering. ● Analyse and implement the AI models with artificial neural networks ● Understand/Define the fuzzy logic and genetic algorithms ● Design/Implement mechatronic systems with techniques used in AI			
Course Content	**Course Plan** Introduction The definition and History of AI Expert Systems Rule Based System Application of expert systems Fuzzy logic Application of Fuzzy logic			

	Decision Support Systems Genetic Algorithms Artificial Neural Networks Back-propagation networks Recurrent networks Application of Artificial Neural Networks Software used in AI Applications Artificial Intelligence and ethics			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			60%
	• Seminars			-
	• Laboratory			-
	• Case studies			20%
	• Role play			-
	• Problem-based learning			20%
	• Study visits			-
	• Work placement			-
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	-	-	-
	• Seminars	1	-	50%
	• Midterm	-	-	-
	• Final Exam	1	-	50%
Course resources	**Resources**			**Number**
	• Classroom(e.g)			1
	• PC Laboratory (e.g)			1
	• Moodle			1
	• Softwer			-
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**

	• Lectures	2	30
	• Seminars		15
	• Laboratory		-
	• Assignments	-	20
	• Independent Study	-	83
	• Exam	-	2
Literature/References	Peter Norvig, Stuart Russell, (2023), Artificial Intelligence: A Modern Approach, Global Edition Bradley D. A., Seward D., Dawson D., Burge S. (2000), Mechatronics and the Design of Intelligent Machines and Systems, CRC Press		
Ethical Standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. **Exams (50% Final)**: All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions. **Seminars (50%):** Seminars must reflect the student's own independent work. Collaboration, if permitted,must be properly cited. Plagiarism in seminar submissions will be monitored using Turnitin. The similarity index must be below 15% for Bachelor's level and below 10% for Master's level (excluding references, quotes, and small sources).		
Contact			

Subject	**Embedded Systems**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatory (M)	5	5	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	The aim of this course is to make students competent in using their programming and electronics skills for hardware manipulation. During the course, the students are required to analyse specific problems and solve them using microcontroller programming and setting up data I/O registers, timers, interrupts, ADC, USART communication, etc.			
Learning Outcomes	• Analyse engineering problems and create solutions by using embedded systems.			

	• Be able to read the datasheet for different microcontrollers • Implement in practice the electrical circuit and setup required for specific microcontrollers • Be able to set up data I/O, timers, interrupts, ADC, and USART.			
Recommended prerequisites:	Computer Science 1 Computer Science 2 Laboratory 2			
Course Content (for 15 weeks)	Introduction to microcontrollers Microcontroller hardware AVR Programming in C I/O Register manipulation Bitwise operations Timers Counters Interrupts ADC Conversion PWM Programming Serial communication • USART			
Teaching/ Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			30%
	• Exercises			20%
	• Self-study			50%
Assessment Methods	• Exercises	6	2,4,6,8,10,12	50%
	• Final exam	1	15	50%
Course resources	**Resources**			**Number**
	• Classroom			1
	• IT laboratory			1
	• Moodle			
	• AVR Development Environment			

	• Beamer (Projector)

	Activity	Weekly hrs	Total workload
ECTS Workload	• Lectures	2	30
	• Exercises	2	30
	• Self-Learning		88
	• Exams		2

Literature/References	• AVR Microcontroller and Embedded Systems: Using Assembly and C (Pearson Custom Electronics Technology), Muhammad Ali Mazidi, Sarmad Naimi, Sepehr Naimi • C Programming Language, 2nd Edition, Dennis M. Ritchie, Brian W. Kernighan. • C Programming: A Modern Approach, Kim N. King (2008). • Instructions provided relevant teaching material (notes) in Albanian and English and internet links
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.
Contact	

Subject	**Mechatronic Systems (Design and Implementation)**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatory (M)	5	5	

Course Lecturer **Course Assistant** **Course Tutor**	
Aims and Objectives	This course focuses on enabling the students to learn the different systems and its design. Understanding the system includes its control mechanism and various real time interfacing techniques. Different case studies of control, drives and real time interfacing are also learnt by students so that they can design, control, interface and implement a system off their own at the end of the course.
Learning Outcomes	Upon successful completion of the course, the student is expected to: • Demonstrate an understanding of the concepts of various controlling mechanisms. • Analyse the different systems and its design • Demonstrate an understanding of real time interfacing. • Design and implement mechatronic systems

Course Content	**Course Plan**			
	Introduction Mechatronic systems Integrated design issue in mechatronic Mechatronics Design Process Modelling and Simulation of Physical Systems Electrical, Mechanical Systems System Control Signals, Systems and Control Signal Conditioning Real Time Interface Elements of a data acquisition and Control system Overview of I/O process Case Study I Case Study II Case Study III			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			60%
	• Seminars			-
	• Laboratory			-
	• Case studies			25%
	• Role play			-
	• Problem-based learning			15%
	• Study visits			-
	• Work placement			-
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	-	-	-
	• Assignments	1	-	50%
	• Midterm	-	-	-
	• Final Exam	1	-	50%

Course resources	**Resources**		**Number**
	• Classroom(e.g)		1
	• PC Laboratory (e.g)		1
	• Moodle		1
	• Softwer		-
	• Projector		1
ECTS Workload	**Activity**	**Weekly hrs**	**Total workload**
	• Lectures	2	30
	• Seminars		-
	• Laboratory		-
	• Assignments	-	30
	• Independent Study	-	88
	• Exam	-	2
Literature/References	Satya Bir Singh, Prabhat Ranjan, Alexander V. Vakhrushev, A. K. Haghi, Mechatronic Systems Design and Solid Materials: Methods and Practices, 1st edition, (2021). Devdas Shetty, Richard A. Kolk, MECHATRONICS SYSTEM DESIGN (2011)		
Ethical Standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. **Exams (50% Final)**: All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions. **Case Study Analysis (50%):** Case study analyses must reflect the student's own independent work. Collaboration, if permitted,must be properly cited. Plagiarism in case study submissions will be monitored using Turnitin. The similarity index must be below 15% for Bachelor's level and below 10% for Master's level (excluding references, quotes, and small sources).		
Contact			

Subject	**Robotics**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatory (M)	5	5	

Course Lecturer **Course Assistant** **Course Tutor**	
Aims and Objectives	The aim of the course is to give basic knowledge and methodologies for the use and operation of robots and to give basic knowledge and methodologies for modelling, analysing, and designing multi-body Robotic Systems. It provides the understanding of robot and robotics. Furthermore, it provides the basic understanding of sensors, control system that are used in robotics and robotics applications.
Learning Outcomes	Students should be able: ● Apply the principles of robot kinematics, including rotational and homogeneous transformations, to analyze and solve problems related to robot motion and positioning. ● Demonstrate the ability to model and analyze the dynamics of robots, including velocity, acceleration, and force interactions. ● Utilize trajectory generation techniques to plan and simulate motion paths for industrial robots in automation tasks. ● Design and implement robot control systems to enhance precision, stability, and efficiency in robotic operations. ● Evaluate and optimize robot grasping and manipulation strategies to meet specific industrial and automation requirements.
Course Content	**Course Plan for 15 Weeks** Introduction Robots in automation and definitions Types of robots and their applications Parts of industrial robots Kinematics of robots Rotational Transformations Homogeneous Transformations Denavit-Hartenberg notation Analysis of velocity and acceleration Dynamics of robots Trajectory Generation Robot Control Grasping and Manipulation
Teaching/Learning Methods	**Teaching/Learning Activity** — **Weight (%)** • Lectures — 30% • Projects — 35% • Laboratory Practical — 15% • Case studies — 5% • Exercises — 15%

Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Final Exam	1	-	50%
	• Projects	1	-	40%
	• Homework			10%
Course resources	**Resources**			**Number**
	• Classroom (e.g)			1
	• Laboratory (e.g)			1
	• Moodle			1
	• Software MATLAB/SIMULINK, Python, ROS			1
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	30
	• Numerical Exercises		1	15
	• Laboratory		1	15
	• Projects			40
	• Independent Study		-	48
	• Exams		-	2
Literature/References	Modern Robotics Mechanics, Planning, and Control, 2017 Introduction to Robotics: Mechanics and Control 4th Edition, by John Craig (Author), 2017 Mark W. Spong , Seth Hutchinson,, M. Vidyasagar, Robot Modeling and Control, 2005 Siciliano, B., Sciavicco, L., Villani, L., Oriolo, G., Robotics Modelling, Planning and Control, 2009			
	-This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. -All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions.			
Contact				

Subject	**Image Processing**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatary (M)	5	4	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	This course introduces fundamental concepts and techniques for image processing. Topics to be covered include image formation, image filtering, edge detection and segmentation, morphological processing, registration, object recognition, object detection etc.			
Learning Outcomes	Upon successful completion of the course, the student is expected to: ● Understand the major concepts and techniques in image processing ● Design and implement algorithms to solve practical problems in the field of Image Processing ● Analyse current research in the fields ● Prepare for research in image processing			
Course Content	**Course Plan** Introduction Image formation and perception Image representation Image Enhancement Image Filtering Frequency Domain Filtering Morphological Image Processing Image Transforms Image Registration Edge Detection Image Segmentation Object Recognition Classification Object Detection and Tracking Image Processing in Automation			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			70%
	• Seminars			-
	• Laboratory			-

	• Case studies			15%
	• Role play			-
	• Problem-based learning			15%
	• Study visits			-
	• Work placement			-
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	-	-	-
	• Assignments	1	-	50%
	• Midterm	-	-	-
	• Final Exam	1	-	50%
Course resources	**Resources**			**Number**
	• Classroom(e.g)			1
	• PC Laboratory (e.g)			1
	• Moodle			1
	• Software			-
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	30
	• Seminars			-
	• Laboratory			-
	• Assignments		-	20
	• Independent Study		-	68
	• Exam		-	2
Literature/References	Digital Image Processing, Rafael C. Gonzales, Richard E. Woods, 4th edition, (2019). Digital Image Processing and Analysis, Scott E Umbaugh, 4th Edition, (2024).			
Ethical Standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. **Exams (50% Final)**: All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any			

	form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions. **Case Study Analysis (50%):** Case study analyses must reflect the student's own independent work. Collaboration, if permitted, must be properly cited. Plagiarism in case study submissions will be monitored using Turnitin. The similarity index must be below 15% for Bachelor's level and below 10% for Master's level (excluding references, quotes, and small sources).
Contact	

Subject	**Industrial And Organizational Psychology**			
	Type	Semester	ECTS	Code
	Mandatory (M)	5	3	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	The course provides knowledge to students about the Industrial and Organizational Psychology in general. Considering that nowdays this branch of Psychology in developed countries is taking an important place, it is significant importance that our students also must get acquainted with the aims and objectives of this Psychology. Students will have the opportunity to learn about the psychological concepts used in the engineering context, organizational psychology, human-work resource relationships, work characteristics, and prepare for work environments.			
Expected results	Upon successful completion of this course, students will be able to: • Analyze employee selection, performance evaluation, and training methods to improve organizational outcomes. • Apply psychological principles to enhance motivation, satisfaction, and communication in workplace settings. • Develop strategies to address occupational health challenges and promote employee well-being.			
Course Content **for 15 weeks**	**Weekly plans**			**WEEK**
	Introduction to I/O Psychology Job Analysis and Evaluation Legal issues in the selection of employees Employee Selection: Recruitment and interviewing Employee Selection: References and Testing Evaluation of selection techniques and decisions Employee Performance Evaluation			

	Employee training and development Employee motivation Employee satisfaction and commitment Organizational Communication Leadership Group behavior, teams and conflicts Organizational development Occupational health: Environmental impacts on mental health; Work / family conflict

Teaching methods	**Activity**	**Weight (%)**
	• Lectures	50%
	• Case studies	10%
	• Simulation of roles	10%
	• Problem-based learning	20%
	• Study visit	%
	• Work practice	10%

Assessment methods	**Evaluation activity**	**Number**	**WEEK**	**Weight (%)**
	• Participation / engagement			10%
	• Colloquium1			20%
	• Seminar paper			20%
	• Final exam			50%

Course resources	**Resources**	**Number**
	• Class (eg)	1
	• Laboratory (eg)	
	• Moodle	1
	• Projector	1

Workloads and activities	**Activity**	**Weekly hours**	**Total load**
	• Lectures	2	30
	• Colloquies		2
	• Exercise		15
	• Practice		-

	• Independent learning	42
	• Final Exam	1
Literature / References	Muchinsky, P. M. Psikologjia e Zbatuar ne Pune. Hyrje ne Psikologjine e Punes dhe Organizatave. Botimi i shtate (Albanian) Aamodt, MG (2015). Industrial / organizational psychology: An applied approach. Cengage Learning. (English) Additional recommended literature will be provided during the semester.	
Contact		

Subject	**Application of Mechatronics in Medicine**			
	Type	**Semester**	**ECTS**	**Code**
	ELECTIVE (E)	5	3	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	Mechatronics has emerged from the laboratory to find real applications in many areas including medicine. In fact mechatronic systems applicable in medicine is extremely broad, including rehabilitation and nursery activities, medical measurements and diagnostics, assisted surgery and surgery training, application examples such as hip surgery, head surgery and much more. In this course the students will learn the application areas of mechatronics in medicine.			
Learning Outcomes	On successful completion of this module, a student should be able to: ● Understand the sources of biologic signals ● Define/Understand the principles of biomedical sensors ● Design and implement the bio-potential Amplifiers			
Course Content for 15 weeks	**Course Plan** Introduction The discipline of Biomedical Engineering Bioelectric phenomena The sources of biological signals Biomedical Sensors Bio-potential Electrodes Bio-potential Amplifiers Instrumentation Amplifiers			

	Biomedical Imaging Magnetic Resonant Imaging (MRI) Medical Instruments Pacemakers Applied Project I Applied Project II Applied Project III			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			50%
	• Seminars			-
	• Laboratory			20%
	• Case studies			-
	• Role play			-
	• Problem-based learning			30%
	• Study visits			-
	• Work placement			-
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	-	-	-
	• Laboratory projects	-	-	50%
	• Midterm	-	-	-
	• Final Exam	1	-	50%
Course resources	**Resources**			**Number**
	• Classroom(e.g)			1
	• Laboratory (e.g)			1
	• Moodle			1
	• Softwer MATLAB/SPSS/SIMULINK			-
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	30

	• Seminars		-
	• Laboratory		15
	• Assignments	-	20
	• Independent Study	-	23
	• Exam	-	2
Literature/References	Siamak Najarian, Javad Dargahi et.al, Mechatronics in Medicine A Biomedical Engineering Approach, (2011). Kaushik Kumar, J Paulo Davim, Design, Development, and Optimization of Bio-Mechatronic Engineering Products, (2019).		
Ethical Standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. **Exams (50% Final)**: All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions. **Laboratory Project (50%)**: Laboratory project must reflect the student's own independent work in laboratory.		
Contact			

Subject	**Application of Mechatronics in Agriculture**			
	Type	**Semester**	**ECTS**	**Code**
	ELECTIVE (E)	5	3	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	This course equips students with skills and competences to address challenges in agriculture using mechatronic systems. Students will explore the integration of mechatronic systems in agricultural machinery to handle uneven terrain, varying weather conditions, and sensory device applications. The course emphasizes practical skills in applying mechatronic solutions to tractors, harvesting systems, product selection and packing, and other agricultural operations, enabling students to implement innovative and efficient solutions tailored to modern agricultural needs.			
Learning Outcomes	• Design and implement mechatronic systems for agricultural applications, including tractors, harvesting systems, and automated packing solutions. • Integrate and optimize sensory devices and unmanned systems to improve agricultural efficiency and address environmental challenges. • Apply solar systems and GPS technologies in agriculture to enhance precision, sustainability, and operational effectiveness.			

Course Content	**Course Plan**			
	Introduction			
	Mechatronics in Agriculture			
	Agricultural Machinery			
	Types of sensors used in Agriculture			
	Soil Sensors			
	Electrical Conductivity Sensors			
	Mechanical Sensors			
	Requirements of Agricultural Systems			
	Robots in Agriculture			
	Unmanned systems			
	Farming Systems			
	Automatic Packing systems			
	Applied Project I			
	Applied Project II			
	Applied Project III			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			50%
	• Seminars			-
	• Laboratory			20%
	• Case studies			-
	• Role play			-
	• Problem-based learning			30%
	• Study visits			-
	• Work placement			-
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	-	-	-
	• Laboratory projects	-	-	70%
	• Midterm	-	-	-
	• Final Exam	1	-	30%

Course resources	**Resources**	**Number**
	• Classroom(e.g)	1
	• Laboratory (e.g)	1
	• Moodle	1
	• Softwer MATLAB/SPSS/SIMULINK	-
	• Projector	1

ECTS Workload	**Activity**	**Weekly hrs**	**Total workload**
	• Lectures	2	30
	• Seminars		-
	• Laboratory		15
	• Assignments	-	20
	• Independent Study	-	23
	• Exam	-	2

Literature/References	Digital Technology for Precision Agriculture: Robot,drone, AGV, mechatronics, CAD/CAM/CAE and Sensors Applicant Technologies, 2021, Gopal U. Shinde, P. K. Ghosh, Prabhat Kumar Robotics and Mechatronics for Agriculture 1st Edition, Kindle Edition, Dan Zhang, Bin Wei, 2017
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.
Contact	

Subject	**Power Electronics and Drives**			
	Type	**Semester**	**ECTS**	**Code**
	ELECTIVE (E)	5	3	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives				

	Characteristics of power electronic devices, switching characteristics of devices, power losses and thermal design. Classes of power converters and their operations: rectifiers; AC-AC Converters; DC-DC Converters, Inverters. Voltage and current source converters. Hard and soft-switching and resonant circuits. Power supplies (uninterruptible, switchmode). Motor drives: review of motor theory, power electronic control principles, vector and servo drives (stepper, DC, induction, brushless PM and switched-reluctance). Modulation methods. Motor and drive selection and application.
Learning Outcomes	After completing this course, students will be able to: • Understand the components and key characteristics of power electronics, including the basic operation, losses, and efficiency of power electronic converters. • Analyze power electronic circuits using various methods and develop a good understanding of practical issues in circuit design. • Develop skills to understand operational issues and limitations of practical converters in industrial applications.
Course Content	**Course Plan** Introduction Definition of power electronics and characteristic of SCR Triggering of SCR and its gate characteristic Trigger circuits of thyristors Semi conductor devices of thyristor family and their characteristics (Diac, Triac, GTO, MOSFET,IGBT) Rectifiers AC-AC Converters DC-DC Converters Inverters Power Supplies Switching Mode Power Supplies Power Electronic Control Principles Motor Drives AC Motor Drives Motor and Drive Selection and Application

Teaching/Learning Methods	**Teaching/Learning Activity**	**Weight (%)**
	• Lectures	70%
	• Seminars	-
	• Laboratory	-
	• Case studies	15%
	• Role play	-
	• Problem-based learning	15%
	• Study visits	-
	• Work placement	-

Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	-	-	-
	• Assignments	1	-	20%
	• Midterm	-	-	-

	• Final Exam	1	-	80%

Course resources	**Resources**	**Number**
	• Classroom(e.g)	1
	• PC Laboratory (e.g)	1
	• Moodle	1
	• Softwer	-
	• Projector	1
	•	

ECTS Workload	**Activity**	**Weekly hrs**	**Total workload**
	• Lectures	2	30
	• Seminars		-
	• Laboratory		-
	• Assignments	-	10
	• Independent Study	-	48
	• Exam	-	2

Ethical Standard	This course follows UBT College's Code of Ethics, requiring students to uphold academic integrity in all assessments: assignments 20% and the final exam 80%. All exams must be completed independently, without unauthorized materials or collaboration. Any form of cheating will result in immediate failure of the exam and disciplinary action. Case analyses and projects must reflect independent work, with collaboration allowed only if explicitly stated by the instructor. Plagiarism is permitted up to 15%, and Turnitin will be used for verification. Academic dishonesty will result in serious consequences, including failing the course.
Literature/References	Wilamowski, Bogdan M., and J. David Irwin, eds. Power electronics and motor drives. CRC press, 2018. Emadi, Ali, ed. Handbook of automotive power electronics and motor drives. CRC press, 2017. Kumar, Vinod, et al. Power electronics, drives, and advanced applications. CRC Press, 2020.
Contact	

Subject	**Additive Manufacturing**			
	Type	**Semester**	**ECTS**	**Code**
	ELECTIVE (E)	5	3	

Course Lecturer **Course Assistant**	
Aims and Objectives	Through this course, students will be provided with knowledge about Additive Manufacturing (AM). Specifically, topics related to introduction to AM, applications that AM has in education and industry, operation of AM, aspects of design and calibration of AM machines, materials used for AM, system classifications, 3D scanning and reverse engineering, various applications of technologies including the field of medicine, and how to choose a AM Machine. The purpose of this course is to equip students with scientific and engineering knowledge in the field of Additive Manufacturing, including theoretical and practical expertise through projects. Based on this goal, we aim to meet the objectives, so that each student can understand Additive Manufacturing along with different requirements to solve real problems in practice.
Learning Outcomes	Upon completion of this course, students will be able to: • Understand the theoretical aspects of additive manufacturing • Design parts, recognize and distinguish machines, and materials for additive manufacturing • Use 3D scanning technology and reverse engineering techniques for industrial parts

Course Content	The course plan for 15 weeks will be as follows: Notification and organization of the course; Introduction; AM applications in Education and Industry; How Does AM Work; Design for AM; Calibrating the AM Machine; Materials for AM; Semester project; Classifications of AM and AM Systems; 3D Scanning; Reverse Engineering; Common Applications of AM Technologies; AM in Medicine; How to Select AM and Machine; Final project.		
Teaching/Learning Methods	**Teaching/Learning Activity**		**Weight (%)**
	• Lectures		30%
	• Project		20%
	• Exercises		20%
	• Case studies		10%
	• Role simulation		10%
	• Problem solving		10%
Assessment Methods	**Assessment Activity**	**Week**	**Weight (%)**
	• Participation	15	10%
	• Activity in lecture	15	10%
	• Project	15	80%
Course resources	**Resources**		**Number**
	• Class		1
	• Moodle		1
	• Software		1
	• Projector		1
	• PC or Laptop		1
	• Virtual Reality		1
	• 3D Scanner		1
	• AM Machine		1
ECTS Workload	**Activity**	**Weekly hrs**	**Total workload**
	• Lectures	2	30
	• Project		35
	• Exercises	1	15
	• Independent learning		10
Literature/References	Basic literature: • Rafiq Noorani. (2018). 3D Printing: Technology, Applications, and Selection. Taylor & Francis Group, LLC. ISBN-13: 978-1-4987-8375-0 Additional literature: • Rupinder Singh, J. Paulo Davim. (2019). Additive Manufacturing: Applications and Innovations. Taylor & Francis Group, LLC. ISBN-13: 978-1-1380-5060-0 • Steinar Killi. (2017). Additive Manufacturing Design, Methods, and Processes. Pan Stanford Publishing Pte. Ltd. ISBN 978-1-315-19658-9 • Andreas Gebhardt, Jan-Steffen Hötter. (2016). Additive Manufacturing: 3D Printing for Prototyping and Manufacturing. Hanser Publications. ISBN 978-1-56990-583-8 • Ian Gibson, David Rosen, Brent Stucker, Mahyar Khorasani. (2021). Additive Manufacturing Technologies Third Edition. Springer Nature Switzerland. ISBN 978-3-030-56127-7 • Ben Redwood, Filemon Schöffer & Brian Garret. (2017). The 3D Printing Handbook. 3D Hubs B.V. ISBN 978-90-827485-0-5 • Betim Shabani, Vladimir Dukovski. (2021). Additive Manufacturing and Reverse Engineering: Research and Manufacturing of Complex Parts. Nova Science Publishers, Inc. ISBN 978-1-53619-718-1		

Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including project, activity in lectures and participation. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.
Contact	

Subject	**Renewable Energy**			
	Type	**Semester**	**ECTS**	**Code**
	OBLIGATORY (O)	5	3	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	At the end of this course students will be able to: • Expand knowledge about various forms of renewable energy sources, • Describe the fundamentals of Solar Physics and demonstrate the solar thermal and electrical gadgets for the societal needs, • To understand the theory and applications of thermodynamics, • Describe the fundamentals and main characteristics of wind, small hydro, geothermal energy and other new renewable energy technologies.			
Learning Outcomes	Upon completion of this course the student will be able to: • Knowledge the various form of energy, also different energy conversion technology. Describe how thermal engineering is applied in renewable energy conversion practice. • Application mathematical concepts and principles in renewable energy technology. • To understood the importance of energy in economic development and need for energy conservation.			
Course content for 15 weeks	Introduction to Energy Studies Solar Energy Conversion Technologies Thermal Engineering Energy Auditing and Management Advanced Numerical Methods Renewable Energy Laboratory – I Waste to Energy Conversion Technologies Wind Energy, Small Hydro and New Renewable Energy Technologies Power Systems for Renewable Energy Sources Energy Economics and Policies Research Methodology Renewable Energy Laboratory – II Project			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			40%
	• Seminars			10%
	• Case studies			10%

	• Numerical Exercises			30%
	• Role play			-
	• Problem-based learning			10%
	• Study visits			-
	• Work placement			-
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	2	6 and 14	20%
	• Group work/homework			20%
	• Mid-term exam	1	7	30%
	• Final exam	1	15	30%
Course resources	**Resources**			**Number**
	• Class (e.g)			1
	• Laboratory (e.g)			
	• Moodle			1
	• Softueri MATLAB /SIMULINK, T*SOL. PV*SOL, Working Model 2D			1
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	30
	• Numerical Exercises			
	• Laboratory		1	15
	• Practice in the industry			10
	• Independent learning			60
	• Exams		2	5
Literature/References	Fundamentals and Applications of Renewable Energy 1st Edition by Mehmet Kanoglu (Author), Yunus Cengel (Author), John Cimbala (Author), 2019 Renewable Energy Engineering 1st Edition, by Nicholas Jenkins (Author) Solar energy engineering: processes and systems, S. Kalogiru. (2009). Renewable 2021 Global Status Report - REN21			

	Solar Engineering of Thermal Processes, J. Duffie, W. Beckman. Fourth Edition. Sustainable Energy Systems and Applications, I. Dinçer and C. Zamfirescu, LLC 2011.
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. **Exams (40% Mid-Term, 30% Final):** All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions. **Case Study Analysis (20%):** Case study analyses must reflect the student's own independent work. Collaboration, if permitted,
Contact	

Subject	**Special Topics in Computer Science**			
	Type	**Semester**	**ECTS**	**Code**
	Elective (E)	5	3	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	This course provides students with skills and competences to explore advanced and emerging topics in computer science, driven by technological advancements or community and student interests. Students will engage in intensive study of specialized areas, developing practical skills in applying theoretical principles and utilizing relevant software tools. The course emphasizes addressing current challenges, exploring recent developments, and acquiring competence in solving complex problems within a specialized domain of computer science.			
Learning Outcomes	• Explore and analyze recent developments in specialized computer science topics, acquiring a comprehensive understanding of their applications and implications. • Apply theoretical principles and software tools to address complex challenges and implement solutions in the chosen area of study. • Demonstrate competence in identifying and addressing major research problems within the specialized field, integrating relevant peripheral topics and methodologies.			
Course Content for 15 weeks	Based on latest trends on technology and engineering, topics and content will be adapted and implemented in practise.			
	Teaching/Learning Activity			**Weight (%)**
	• Lectures			

Teaching/Learning Methods	• Projects • Numerical Exercises • Problem-based learning			
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz • Projects • Mid-term exam • Final exam			
Course resources	**Resources**			**Number**
	• Class (e.g) • IT Laboratory (e.g) • Moodle • Software • Projector			1 1 1 1 1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures • Exercises • Project Seminar • Practice in the industry • Independent learning • Exams		2 1	
Literature/References	Principles of Computer Science: An Invigorating, Hands-on Approach, Joshua Crotts, 2023			

Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.
Contact	

Subject	**Augmented, Virtual & Mixed Reality**			
	Type	**Semester**	**ECTS**	**Code**
	Elective (E)	5	3	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	VR (Virtual Reality), MR (Mixed Reality) and AR (Augmented Reality) are technologies that are quickly changing the way we consume media, play games, educate, and communicate. In this course, you will not only be introduced to these technologies through hands-on experience, but you will also learn key skills associated with designing and developing software for these platforms. Putting emphasis on production workflow, you will learn how to import 3D models into Unity3D and apply simple game mechanics.			
Learning Outcomes	Upon successful completion of this course, students should be able to: • Differentiate between Virtual, Mixed and Augmented Reality platforms. • Identify appropriate design methodologies for immersive technology development, especially from a physiological perspective. • To develop 3D virtual environments, interaction techniques and immersive virtual reality applications. • Effectively categorise the benefits/shortcomings of available immersive technology platforms.			
Course Content for 15 weeks	Topics to be covered: • Introduction • Bird's Eye View • The Geometry of Virtual Worlds • Light and Optics • The Physiology of Human Vision • Visual Perception and Rendering • Motion in Real and Virtual Worlds • Tracking • Interaction • Audio • Evaluating VR Systems and Experiences • Frontiers • Augmented Reality System Structure of Augmented Reality; • Key Technology in AR; General solution for calculating geometric & illumination consistency in the augmented environment			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			40%
	• Projects			20%
	• Exercises			20%

	• Problem-based learning			20%
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	2	2	10%
	• Projects			50%
	• Final exam			40%
Course resources	**Resources**			**Number**
	• Class (e.g)			1
	• VR Laboratory			1
	• Moodle			1
	• Software			1
	• Projector			1
	•			
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	30
	• Exercises		1	15
	• Project			40
	• Practice in the industry			2
	• Independent learning			30
	• Exams			3
Literature/References	• Smart VR/AR/MR Systems for Professionals (1st Edition) by Sunpreet Singh, Karupppasamy Subburaj, Saša Ćuković, Kamalpreet Sandhu, Gerrit Meixner, and Radu Emanuil Petruse: Published in February 2024. • VIRTUAL REALITY by Steven M. LaValle: Published by Cambridge University Press in 2023. CAMBRIDGE UNIVERSITY PRESS • Creating Augmented and Virtual Realities: Theory and Practice for Next-Generation Spatial Computing (1st Edition) by Erin Pangilinan, Steve Lukas, and Vasanth Mohan: Published in 2019. • Other material that is distributed during the course or published on the course's website (MOODLE)			
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. Exams: All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions.			
Contact				

Course	**Engineering Project Management**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatory (M)	6	2	
Lecturer **Case Assistant** **Tutor of the subject**				
Goals and Objectives	The main aim of this course is to prepare students with the skills and competence needed to understand the fundamental elements of project management and apply theoretical knowledge in practice for managing various types of engineering projects. The course aligns with IPMA Level E and other International Practices (IPMA/PMI) guidelines. Course Objectives • Develop the competence to understand and analyze project needs. • Gain skills to manage the stages of the project lifecycle effectively. • Build competence in creating and managing work package divisions (WBS). • Develop analytical skills for conducting risk analysis and creating quality plans. • Enhance communication skills for preparing and implementing communication plans.			
Expected results	• Understand and analyze project goals, objectives, and life cycle methodologies, including stakeholder identification, risk management, and quality assurance, to align projects with industry standards and requirements. • Develop practical skills to create and manage project components, such as cost estimation, work safety plans, and communication strategies, while effectively using project management tools and techniques (ITTO). • Demonstrate competence in preparing, implementing, and presenting comprehensive project proposals, including documentation, monitoring, and evaluation, ensuring alignment with project management best practices.			
Content **(for 15 weeks)**	**Weekly Plan**			**Week**
	Introduction to Project Management Separating groups, assigning relevant topics to all groups and discussing / clarifying questions Project needs analysis Logic Framework (Goals, Objectives, Activities, Indicators) Project life cycle Scheduling Work breakdown Structure (WBS) Stakeholders / risk analyis Excersies in practical Project Creating a quality management plan, monitoring the project			
	Project cost analysis (purchases/planing/contracts/ suppliers)			
	Auditing in projects & Report summary creation			
Teaching methods	**Actvities**			**Weight(%)**
	• Lecture			40%
	• Demonstration of practical projects			15%
	• Case studies			15%
	• Simulation of role / practical exercises			10%
	• Troubleshooting			15%
	• Other			5%

Methods of assessment	**Evaluation**	**Number**	**Week**	**Weight (%)**
	• Participation, activities	12		10%
	• Group Team Work/ Project Work	1		40%
	• Exam	1		50%
	Only students with a satisfactory participation of at least 75% have submitted the project by deadline, have performed the presentation, and will be graded. The course is a project based and students failing the course/ by not meeting course requirements will have to re-attend the course. Course evaluation will be based on the team work, presentation skills and project knowledge and final exam.			
Resources and means of concretization	**Tools**			**Number**
	• Classroom			1
	• Moodle			1
	• Projector			1
Charges and activities	Type of activity Hours weekly Total load		Hours weekly Total load	Total Hour Workload for Course
	• Lectures (including classroom exercises)			24
	• Project prepration			18
	• Study time, prepration, etc.			18
Literature/References	• A guide to the project management body of knowledge 7th Edition, PMI Issued 2021 • An Introduction to Project Management, Seventh Edition: Predictive, Agile, and Hybrid Approaches, Kathy Schawlbe, 2021 • Project Management: A Systems Approach to Planning, Scheduling, and Controlling, Harold Kerzner , 2017 • Professor's slides in ppt (based on IPMA/ PMI and PRINCE 2) • IPMA Handbook – NCB Version 4 • UBT Project Template / Format • Excercise – web based materials • Practical projects • Etc – moodle should be followed continuously by the student to get updates			
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.			
Contact				

Course Name	**Smart Manufacturing & Industrial internet of Things (SM & IIoT)**			
	Type	**Semester**	**ECTS**	**Code**
	OBLIGATIVE (O)	6	4	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	This course equips students with skills and competences to design, implement, and manage smart manufacturing systems using Industrial Internet of Things (IIoT) technologies. Students will explore the opportunities and challenges of IIoT in manufacturing, focusing on the integration of smart machines, digitalization, and automation in Industry 4.0 and 5.0 environments. The course emphasizes the practical skills needed to design and control			

	smart factories, adapt product designs for smart manufacturing, and evaluate the economic and organizational implications of IIoT implementation. Additionally, students will develop competence in applying analytical methods and exploring the future trends in smart manufacturing technologies.
Learning Outcomes	• Design and integrate smart machines, robots, and products into automation solutions for Industry 4.0 and 5.0 environments, considering technical and operational requirements. • Analyze and implement control principles for automation systems, ensuring efficient interaction between smart machines and IIoT systems. • Evaluate and apply key technologies for designing and managing smart factories, addressing economic and organizational aspects of digitalization and automation. • Demonstrate problem-solving skills by researching advancements in IIoT and smart manufacturing, presenting findings, and proposing innovative solutions.
Course Plan	**Weekly Plan/for 15 weeks**

The Internet of Things: Thinking about Prototyping Automatic Storage Management in a Cloud World Introduction to Smart Manufacturing: Smart Design/Fabrication Smart Applications Smart and Empowered Workers	
Lectures Case studies Guest speakers from industry (if available) Student individual assignments based on Tutorial material Team assignment Exercise/Practice	

Evaluation Methods

Activity	**Number**	**Week**	**Weight (%)**
Group Projects and Presentation:			20%
Final project			10%
Class Participation			10%
Final Exam Test			60%

Sources & Tools	**Tools** Quantity

	Basic Tools – Board, Marker	1
	Moodle	1
	Projector	1
	Smart factory	1

Loads & Activities	Type of Activity	Hours per Week	**Total Load**
	Lectures	2	30
	Practical Work	2	30
	Self-Study	-	60
	Total	-	120

Literature/References	Hands-On Industrial Internet of Things: Build robust industrial IoT infrastructure by using the cloud and artificial intelligence 2nd ed. Edition by Giacomo Veneri, Antonio Capasso, 2024 Smart Manufacturing (Concepts and Methods), Masoud Soroush, Michael Baldea, Thomas F. Edgar, Publisher Elsevier Science, Year 2020 Hands-On Industrial Internet of Things: Create a powerful Industrial IoT infrastructure using Industry 4.0 by Giacomo Veneri, Antonio Capasso, 2018
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.
Contact	

Subject	**Scientific and Technical Research**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatary (M)	6	2	

Course Lecturer **Course Assistant** **Course Tutor**	
Aims and Objectives	The aim of the course is to give the students the theoretical and practical skills to design, plan, conduct, analyse and present, orally and in written form, a scientific assignment in the area of engineering and to give insight and understanding of research methodology, ethics and sustainability

Learning Outcomes	• explain and apply scientific methodologies, methods, as well as techniques for scientific writing, and research methodology to prepare the writing of a scientific report, as well as a degree project • perform investigation and evaluation using methods, explain and take position to the results, as well as list and summarize related work. • apply the knowledge in scientific writing and research methodology and use the knowledge to write a scientific report and opposition report.			
Course Content for 15 weeks	Topics to be covered: • Introduction to research methods • Research design • Literature research and review • Scientific writing • Scientific presentation • Critical scientific review • Data types and data collection techniques • Quantitative and qualitative methods and data analyses • Ethical issues in research			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			40%
	• Projects			20%
	• Exercises			20%
	• Peer assessment			20%
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz/ mid term	2	2	20%
	• Projects /case studies			30%
	• Oral presentation	1	7	20%
	• Final exam			30%
Course resources	**Resources**			**Number**
	• Class (e.g)			1
	• Laboratory (e.g)			
	• Moodle			1
	• Software			1
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**

	• Lectures	1	15
	• Exercises	1	15
	• Project Seminar		15
	• Independent learning		13
	• Exams		2
Literature/References	**E**ngineering Research: Design, Methods, and Publication" . Tang H., 2020. Research Methods for Engineers. David V. Thiel, Publisher: Cambridge University Press, 2014 Research Methodology: Methods And Techniques (Multi Colour Edition) by C.R. Kothari C.R., Gaurav G. Paperback, 2019 Other material that is distributed during the course or published on the course's website (MOODLE)		
Contact			
Ethical Standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. **Exams (20% Mid-Term, 30% Final):** All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions. **Case Study Analysis (30%):** Case study analyses must reflect the student's own independent work. Collaboration, if permitted, must be properly cited. Plagiarism in case study submissions will be monitored using Turnitin. The similarity index must be below 15% (excluding references, quotes, and small sources).		

Subject	**Internship**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatory (M)	6	3	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	The internship aims to provide students with hands-on experience in applying mechatronics principles in real-world settings. Students will develop professional skills, gain industry insights, and enhance their problem-solving capabilities by working on practical projects within the field.			

Learning Outcomes	Upon successful completion of the internship, students will be able to: • Apply theoretical knowledge from mechatronics courses to solve practical engineering problems. • Collaborate effectively in multidisciplinary teams to address challenges in mechatronics-related projects. • Analyze and document engineering tasks, adhering to professional and ethical standards. • Demonstrate proficiency in integrating hardware and software solutions for industrial or research applications.
Course Content for 15 weeks	The internship will involve: - Practical application of concepts from mechatronics courses. - Hands-on experience in areas such as automation, robotics, and system integration. - Development and testing of prototypes or systems under supervision. - Preparation of a final report detailing tasks, outcomes, and reflections.
Teaching/Learning Methods	**Teaching/Learning Activity** • Supervised Field Work: Students will work under industry or academic mentors. • Project-Based Learning: Tasks will involve real-world challenges relevant to mechatronics. • Guidance Sessions: Regular feedback and consultations with supervisors

Assessment Methods	**Assessment Activity**	**Weight (%)**
	• Internship Participation	30%
	• Final Report and Presentation	50%
	• Supervisor Evaluation	20%

Course resources	**Resources**	**Number**
	- UBT Moodle for documentation and resources.	
	- Laboratory access for prototype testing (if applicable).	
	- Relevant industry tools and software.	

ECTS Workload	**Activity**	**Weekly hrs**	**Total workload**
	Internship Fieldwork	5	75
	Guidance Sessions	1	5
	Preparation of Final Report	-	5
	Independent Study	-	5
	Total Workload	-	90

Literature/References	Craig, Kevin F. (2020). Mechatronics: Principles and Applications (4th Edition). Rajan, J. (2021). Mechatronics Systems: Fundamentals and Applications. Springer. Corke, P. (2017). Robotics, Vision, and Control: Fundamental Algorithms in MATLAB (2nd Edition). Springer. Lee, Edward A. (2021). Introduction to Embedded Systems: A Cyber-Physical Systems Approach (3rd Edition). MIT Press. Industry Standards and Documentation: Manuals, guides, and technical documents provided by internship hosts for hands-on systems and projects.
Ethical standards	Students are expected to maintain professional integrity throughout their internship. Any form of academic or professional dishonesty will result in disciplinary action as per UBT policies.
Contact	

Subject	**Thesis**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatory (M)	6	7	
Course Lecturer **Course Assistant** **Course Tutor**				
Prerequisites	Completion of core courses in Mechatronics Engineering. Approval of the thesis proposal by the academic supervisor.			
Aims and Objectives	The thesis aims to: • Provide students with an opportunity to apply theoretical and practical knowledge acquired during the program. • Develop independent research, problem-solving, and critical thinking skills. • Demonstrate proficiency in designing, implementing, and evaluating mechatronic systems or processes. • Prepare students for professional or research-oriented careers by fostering ethical and professional conduct.			
Learning Outcomes	Upon successful completion of the thesis, students will be able to: • Define and analyze complex engineering problems in mechatronics. • Design and implement innovative solutions integrating mechanical, electronic, and control systems. • Conduct independent research and document findings in a structured and professional format. • Communicate technical information effectively through oral and written presentations.			
Course Content	The thesis includes: **Proposal Phase:** Define the research problem and objectives. Develop a detailed work plan and timeline. **Literature Review:** Analyze existing research to establish a theoretical framework. **Design and Implementation**: Develop the proposed mechatronic system or process. Use simulations, prototypes, or experimental setups as required.			

	Analysis and Evaluation: Test the system, collect data, and analyze results. **Documentation and Presentation:** Write the thesis document. Prepare and deliver an oral defense.

Teaching/Learning Methods	**Teaching/Learning Activity**	
	Independent Research	120
	Supervision Meetings	15
	Design and Implementation	50
	Thesis Writing and Revision	25
	Total	210
	•	

Assessment Methods	**Assessment Activity**	**Weight (%)**
	• Proposal and Work Plan	10
	• Literature Review	10
	• Design and Implementation	30
	• Final Thesis Document	30
	• Oral Defense	20

ECTS Workload	**Activity**	**Weekly hrs**	**Total workload**
	Internship Fieldwork	5	75
	Guidance Sessions	1	5
	Preparation of Final Report	-	5
	Independent Study	-	5
	Total Workload	-	90

Literature/References	Journals, conference papers, and standards related to the thesis topic. Software tools (e.g., MATLAB, AutoDesesk, LabVIEW, Python, etc.)
Ethical standards	Students must adhere to UBT's academic and research integrity policies. Plagiarism or unethical conduct will result in disciplinary actio
Contact	

Subject	**Fuzzy Logic and Control**			
	Type	**Semester**	**ECTS**	**Code**
	ELECTIVE (E)	5	4	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	This Course aims at providing the fundamentals of fuzzy systems and their applications in control. The topics covered include: Conventional and Intelligent control systems, Fuzzy Sets, Fuzzy Arithmetic, Fuzzy Relations, Fuzzy Graphs, Approximate Reasoning and Fuzzy Implications, Applications of Fuzzy logic in Intelligent Control etc.			
Learning Outcomes	After completion of this course, students will be able to: Understand the difference between conventional and intelligent control. Apply the fuzzy sets theory, rules and fuzzy inference. Design/Implement fuzzy controllers.			
Course Content	**Course Plan**			
	Introduction Conventional Control Systems Intelligent Control Crisp Sets and Fuzzy sets Basic Concepts of Fuzzy logic, Fuzzy Sets Fuzzy Arithmetic, Fuzzy Relations Fuzzy Graphs Approximate Reasoning and Fuzzy Implications Applications of Fuzzy logic in Intelligent Control Fuzzy logic modelling and control Fuzzification, inferencing and defuzzification Fuzzy knowledge and rule bases Fuzzy modelling and control schemes for nonlinear systems Self-organizing fuzzy logic control Stability analysis of fuzzy control systems			
	Teaching/Learning Activity			**Weight (%)**
	• Lectures			70%
	• Seminars			-

Teaching/Learning Methods	• Laboratory	-
	• Case studies	15%
	• Role play	-
	• Problem-based learning	15%
	• Study visits	-
	• Work placement	-

Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	-	-	-
	• Assignments	1	-	50%
	• Midterm	-	-	-
	• Final Exam	1	-	50%

Course resources	**Resources**	**Number**
	• Classroom(e.g)	1
	• PC Laboratory (e.g)	1
	• Moodle	1
	• Softwer	-
	• Projector	1

ECTS Workload	**Activity**	**Weekly hrs**	**Total workload**
	• Lectures	2	30
	• Seminars		-
	• Laboratory		-
	• Assignments	-	10
	• Independent Study	-	78
	• Exam	-	2

Literature/References	Clarence W. de Silva, Intelligent Control: Fuzzy Logic Applications, (2018). Timothy J. Ross, "FUZZY LOGIC WITH ENGINEERING APPLICATIONS" (2016), John Wiley & Sons.
Ethical Standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of

	cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. **Exams (50% Final)**: All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions. **Case Study Analysis (50%):** Case study analyses must reflect the student's own independent work. Collaboration, if permitted,must be properly cited. Plagiarism in case study submissions will be monitored using Turnitin. The similarity index must be below 15% for Bachelor's level and below 10% for Master's level (excluding references, quotes, and small sources).
Contact	

Subject	**Autonomous Mobile Robotics**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatory (M)	6	4	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	This course covers fundamentals of mobile robotics that include the mechanical, motor, sensory, perceptual and cognitive aspects of the robots. Students will learn the basic principles in the design and analysis of mobile robotic systems. Topics to be covered are: locomotion, mobile robot kinematics, perception, mobile robot localization, SLAM, planning and navigation.			
Learning Outcomes	Learning outcomes (after completion of the course the student should be able to): ● Be able to describe the basic concepts and algorithms required for mobile robot locomotion, environment perception, probabilistic map based localization and mapping, and motion planning ● Be able to apply these concepts for the design and implementation of autonomous mobile robots acting in complex environment ● Demonstrate the ability to analyze and resolve issues related to mobile robot performance, including locomotion, perception, localization, and navigation in dynamic environments			
Course Content for 15 weeks	Topics to be covered: Introduction, Overview of the Course Locomotion: Legged, Wheeled, Flying and Swimming Mobile Robots Mobile Robot Kinematics: Kinematic Models and Constraints, Path and Trajectory Considerations, Motion Control (Open loop and Feedback Control) Perception: Sensors, Uncertainty, Feature Extraction from range and visual data Mobile Robot Localization: Localization Problem and Challenges, Error Model for Odometric Position Estimation, Map Representation, Probabilistic Map-Based Localization (Markov and Kalman filter localizations), SLAM Problem and its variations, Autonomous Map Building Planning and Navigation: Task and Motion Planning, Obstacle Avoidance, Navigation, Strategies			

Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			40%
	• Laboratory Projects			20%
	• Numerical Exercises			20%
				-
	• Problem-based learning			20%
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	2	2	20%
	• Projects			30%
	• Mid-term exam	1	7	20%
	• Final exam			30%
Course resources	**Resources**			**Number**
	• Class (e.g)			1
	• Laboratory (e.g)			1
	• Moodle			1
	• Softueri: Python			1
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	30
	• Exercises		1	15
	• Project Seminar			20
	• Practice in the industry			8
	• Independent learning			42
	• Exams			5

Literature/References	Introduction to Autonomous Mobile Robots by Roland Siegwart, Illah Reza Nourbakhsh, and Davide Scaramuzza is the second edition, published in 2011 Thrun, S., Burgard, W., & Fox, D. (2005). Probabilistic Robotics, The MIT Press. Cambridge, MA. Third edition has far fewer mistakes. Principles of Robot Motion: Theory, Algorithms, and Implementations (Intelligent Robotics and Autonomous Agents), the MIT Press, Cambridge, MA., Choset, H., Lynch, K. M., Hutchinson, S., Kantor, G., Burgard, W., Kavraki, L. E., & Thrun, S. (2005). Exercises published on the course MOODLE. Other material that is distributed during the course or published on the course's website
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions.
Contact	

Subject	**Machine Learning**			
	Type	**Semester**	**ECTS**	**Code**
	OBLIGATIVE (O)	5	4	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	This course emphasizes learning algorithms and theory including concepts: decision tree, neural network, computational, Bayesian, evolutionary, and reinforcement learning.			
Learning Outcomes	Upon successful completion of the course, the student is expected to: ● Analyse and identify significant characteristics of data sets. ● Develop an understanding of training a learning algorithm including over-fitting, noise, convergence and stopping criteria ● Understand and implement the training, testing, and validation phases of learning algorithms development and deployment ● Apply machine learning algorithms for classification and functional approximation or regression			
Course Content	**Course Plan**			

	Introduction Linear Regression Linear Classification Naïve Bayes Classifier Logistic Regression Multi-Layer Perceptron Neural Network Clustering Dimensionality Reduction, PCA K-Means Clustering Support Vector Machines Decision Trees Gaussian Mixture Models Kernel Density Estimation Bayesian Networks Reinforcement Learning			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			60%
	• Seminars			-
	• Laboratory			-
	• Case studies			20%
	• Role play			-
	• Problem-based learning			20%
	• Study visits			-
	• Work placement			-
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	-	-	-
	• Assignments	1	-	50%
	• Midterm	-	-	-
	• Final Exam	1	-	50%
Course resources	**Resources**			**Number**

	• Classroom(e.g)	1
	• PC Laboratory (e.g)	1
	• Moodle	1
	• Software	-
	• Projector	1

	Activity	**Weekly hrs**	**Total workload**
ECTS Workload	• Lectures	2	30
	• Seminars		-
	• Laboratory		-
	• Assignments	-	20
	• Independent Study	-	68
	• Exam	-	2

Literature/References	Aurelien Geron, Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, 3rd Edition, (2022). Machine Learning: An Algorithmic Perspective (Second Edition) by Stephen Marsland, CRC Press, 2015
Ethical Standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. **Exams (50% Final)**: All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions. **Case Study Analysis (50%):** Case study analyses must reflect the student's own independent work. Collaboration, if permitted,must be properly cited. Plagiarism in case study submissions will be monitored using Turnitin. The similarity index must be below 15% for Bachelor's level and below 10% for Master's level (excluding references, quotes, and small sources).
Contact	

Subject	**Energy Efficiency**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatory Elective	4	3	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	This course is designed to give students the skills to identify and understand energy efficiency and conservation methods used to reduce energy consumption in the built environment. Students will analyse residential and commercial facilities for opportunities to employ these energy saving measures. Students will become familiar with the use of energy monitoring and measuring equipment used for energy auditing. Students will also learn to calculate energy savings and determine environmental impacts of these energy saving methods.			
Learning Outcomes	• Knowledge energy efficiency and conservation methods used to reduce energy consumption in the built environment. • Students will analyse residential and commercial facilities for opportunities to employ these energy saving measures. • Students will become familiar with the use of energy monitoring and measuring equipment used for energy auditing. • Students will also learn to calculate energy savings and determine environmental impacts of these energy saving methods.			
Course Content for 15 weeks	Topics to be covered: Basic areas for energy efficiency and conservation measures Low cost/no cost energy conservation methods (ECM) Weatherization ECMs Replacement vs. Retrofits of equipment Data Acquisition, Monitoring, Auditing, and system balancing equipment for energy analysis, including data loggers, universal data recorder, flue gas analyzer, thermometer, utility meters, combustion analyzers, infrared thermography, airflow velocity meters, relative humidity measures, electrical meters, refrigeration measures, light meters, and sling psychrometer. Energy Bill Analysis, including power factor correction, peak demand limiting, rate structure and comparison to alternative rate opportunities, including green power. HVAC Energy Conservation Measures (ECMs) Other Building Equipment ECMs (Kitchen, laundry, office equipment) Building Envelope ECMs Review renewable energy assessments and analysis (green power), green building, sustainable design. Electrical ECMs – Lighting systems review, pumps, fans, motors review, including efficiencies, belt drives, variable speed/frequency drives, load factors, fan laws and pump curves. Energy Suppliers and fuel Acquisition Prioritization of ECMs based on Cost Effectiveness and environmental impacts. Case studies: Analyses and prioritization of ECMs for a given facility			

Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			40%
	• Projects			20%
	• Exercises			20%
	• Problem-based learning			20%
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	2	2	20%
	• Projects			30%
	• Mid-term exam	1	7	20%
	• Final exam			30%
Course resources	**Resources**			**Number**
	• Class (e.g)			1
	• Laboratory (e.g)			
	• Moodle			1
	• Software			1
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	30
	• Exercises		1	15
	• Project Seminar			20
	• Practice in the industry			10
	• Independent learning			33
	• Exams			2
Literature/References	Energy Efficiency and Management for Engineers By Mehmet Kanoglu · 2020 VSP Rao, “Human Resource Management”, (2010), Excel Books, 3rd Edition MA. Energy Efficiency Concepts and Calculations By Daniel Martinez, Ben W. Ebenhack, Travis Wagner · 2019			

Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.
Contact	

Subject	**Power System Analysis**				
	Type	**Semester**	**ECTS**	**Code**	
	Elective	6	4		
Course Lecturer **Course Assistant** **Course Tutor**					
Aims and Objectives	The course will help students understand how power systems are modeled both at the distribution and transmission levels. The course covers modeling of generators, transformers, and transmission lines. The focus of the course is on long-distance transmission of electric power with an emphasis on admittance and impedance modeling of components and system, power-flow studies and calculations, symmetrical and unsymmetrical fault calculations, economic operation of large-scale generation and transmission systems. A special emphasis is placed on applications of computer-based methods to power-system problems.				
Learning Outcomes	After completing this course, students will be able to: • Identify and describe the fundamental principles of modern power system operation and protection. • Model devices in the power system, such as transformers, motors, and transmission lines. • Analyze single-phase and three-phase systems and examine power flow analysis. • Apply the input bus matrix and solve power flow equations. • Calculate symmetric and asymmetric fault currents and determine the bus impedance matrix.				
Course Content (for 15 weeks)	Introduction Power System Evolution				

	Generation, Transmission and Distribution Components Energy Sources; hydro, thermal, Nuclear etc. Basic introduction to renewable energy; Photovoltaic, Wind, geothermal etc Major electrical components in power station; Alternators, transformers, bus bars, voltage regulators, switch and isolators, metering and control panels Infinite bus concept Voltage levels, AC vs DC Transmission Single phase and three phase power delivery Line parameter calculations Transmission line modelling Performance Analysis				
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**	
	• Lectures			60%	
	• Exercises			30%	
	• Industry			10%	
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**	
	• Exercises			20%	
	• Final exam	1		50%	
	• Project			30%	
Course resources	**Resources**			**Number**	
	• Classroom			1	
	• Laboratory				

	• Moodle		1	
	• Projector		1	
ECTS Workload	**Activity**	**Weekly hrs**	**Total workload**	
	• Lectures	2	30	
	• Exercises	1	15	
	• Industry		10	
	• Self-Learning		63	
	• Exams		2	
Ethical standard	This course follows UBT College's Code of Ethics, requiring students to uphold academic integrity in all assessments: lectures and exercises 20%, seminars 30%, and the final exam 50%. All exams must be completed independently, without unauthorized materials or collaboration. Any form of cheating will result in immediate failure of the exam and disciplinary action. Case study analyses and projects must reflect independent work, with collaboration allowed only if explicitly stated by the instructor. Plagiarism is permitted up to 15%, and Turnitin will be used for verification. Academic dishonesty will result in serious consequences, including failing the course.			
Literature/References	Hadi Saadat. Power System Analysis, third edition. PSA publishing Machowski, Jan, et al. Power system dynamics: stability and control. John Wiley & Sons, 2020. Patel, Mukund R., and Omid Beik. Wind and solar power systems: design, analysis, and operation. CRC press, 2021. Von Meier, Alexandra. Electric power systems: a conceptual introduction. John Wiley & Sons, 2024.			
Contact				

Subject	**Production Technologies**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatory (M)	6	4	
Course Lecturer **Course Assistant** **Course Tutor**				

Aims and Objectives	This lecture course is intended to provide to students solid knowledge of production technology and manufacturing processes. Discuss in detail about technology phases and preparation of technical documentation starting from raw material to final product. Introduce to students casting, forming, machining and welding processes as well as weld testing and advanced processes. After completed this course students will be able to appreciate the practically understand and evaluate which kind of process is more cost effective and reliable to use depending on applications. Beside of cutting processes such as: turning, milling and welding processes such as: arc welding, MIG/MAG, TIG, SAW and friction stir welding will be introduced, non-conventional production methods will be explain.
Learning Outcomes	Upon completion of this module, engineering students will be capable to: • Analyze and apply appropriate production and manufacturing processes for various technical requirements. • Prepare and utilize technical documentation for manufacturing technology phases. • Evaluate and ensure the quality of final products produced through welding and machining processes. • Demonstrate the ability to select and implement efficient manufacturing methods in practical scenarios.
Course Content	**Course Plan** Introduction to Manufacturing Technology Casting and RTM Process Forming Process Fe-C equilibrium Diagram and TTT diagram Welding Processes Welded Joint and symbols Methods of evaluation of the strength of materials Heat Treatment Processes of metals Machining Processes Technology preparation and technical documentation (Practice in the industry) Final exam
Teaching/Learning Methods	**Teaching/Learning Activity** — **Weight (%)** • Lectures — 40% • Seminars — - • Practice — 30% • Case studies — 10% • Role play — - • Problem-based learning — 10% • Study visits — 10%- • Work placement — -

Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	2	6,12	25%
	• Group work/homework			10%
	• Mid-term exam			25%
	• Final exam			40%
Course resources	**Resources**			**Number**
	• Class (e.g)			1
	• Laboratory (e.g)			
	• Moodle			1
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	24
	• Seminars			4
	• Laboratory		0	0
	• Practice in the industry			2
	• Independent learning			96
	• Exams			2
Literature/References	1. Fundamentals of Modern Manufacturing: Materials, Processes, and Systems, 7th Edition, Mikell P. Groover , ISBN: 978-1-119-47521-7, May 2019. 2. Welding Metallurgy and Weldability, John C. Lippold , ISBN: 978-1-118-96031-8, November 2014. 3. Designing Weldments, Ramesh Singh (Original Author), ISBN: 978-1-119-86582-7, April 2022			
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.			
Contact				

Subject	**Production Processes**			
	Type	**Semester**	**ECTS**	**Code**

	CONCENTRATION (C)	6	4
Course Lecturer **Course Assistant**			
Aims and Objectives	Through this course, students are provided with an overview of Production Processes. Specifically, production processes will be elaborated separately, starting from additive manufacturing, processing electronic circuits and boards, continuing with microfabrication, and nano technologies. The purpose of this course is to provide students with scientific and professional knowledge by offering theoretical expertise and engineering practice. Based on this goal, we simultaneously aim to fulfil the objectives so that each student can understand the production processes and the types of processing in addition to the requirements that are needed to realize real projects.		
Learning Outcomes	After completing this course, students will: • Understand the notions of production processes • Distinguish and explain production processes • Apply knowledge about technologies in the production sector • Execute production projects according to technological processes		
Course Content	The course plan for 15 weeks will be as follows: Additive Manufacturing; Additive Manufacturing Technologies; Cost and Time Calculation; Processing of Integrated Circuits; Lithography; Packaging of Integrated Circuits; Semester Project I; Packaging and Assembly of Electronics; Printing of Electronic Boards; Connector Technology; Microfabrication Technologies; Nanofabrication Technologies; Nanoscience; Semester Project II; Final Project.		
Teaching/Learning Methods	**Teaching/Learning Activity**		**Weight (%)**
	• Lectures		30%
	• Project		20%
	• Practice		20%
	• Case studies		10%
	• Role simulation		10%
	• Problem solving		10%
Assessment Methods	**Assessment Activity**	**Week**	**Weight (%)**
	• Attendance	15	10%
	• Activity in lecture	15	10%
	• Project	15	80%
Course resources	**Resources**		**Number**
	• Class		1
	• Moodle		1
	• Software		1
	• Projector		1
	• PC or Laptop		1
ECTS Workload	**Activity**	**Weekly hrs**	**Total workload**
	• Lectures	2	30
	• Project		55
	• Exercises		15
	• Independent learning		20

Literature/References	Basic literature: • Groover, M. P. (2019). Fundamentals of Modern Manufacturing: Materials, Processes, and Systems Seventh Edition. John Wiley & Sons, Inc. ISBN: 978-1-119-47529-3 Additional literature: • Ian Gibson, David Rosen, Brent Stucker, Mahyar Khorasani. (2021). Additive Manufacturing Technologies Third Edition. Springer Nature Switzerland. ISBN 978-3-030-56127-7 • Clyde F. Coombs, Jr. (2008). Printed Circuits Handbook Sixth Edition. The McGraw-Hill Companies. DOI: 10.1036/0071467343 • Marc Madou. (1997). Fundamentals of Microfabrication. CRC Press. ISBN: 0-8493-9451-1
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including project, activity in lectures and participation. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.
Contact	

Subject	**Computer Integrated Manufacturing**			
	Type	**Semester**	**ECTS**	**Code**
	CONCENTRATION (C)	5	4	
Course Lecturer **Course Assistant**				
Aims and Objectives	Through this course, students are provided with an overview of the processes involved in Computer Integrated Manufacturing. Specifically, they will be elaborated separately, starting with the Product Design and CAD/CAM in the Production System, Process Planning and Concurrent Engineering, Production Planning and Control Systems, Just-In-Time and Lean Production. The purpose of this course is to provide students with scientific and professional knowledge by providing theoretical and practical expertise. Based on this goal, we aim to fulfil the objectives that each student can distinguish and understand the processes of Computer Integrated Manufacturing in addition to the requirements needed to solve engineering problems.			
Learning Outcomes	Upon completion of this course, students will: • Understand the notions of computer-integrated manufacturing • Distinguish computer-integrated manufacturing processes • Apply scientific knowledge for design and production • Use different technologies for implementation			
Course Content	The course plan for 15 weeks will be as follows: Announcement and organization of the subject; Product Design and CAD; CAM, CAD/CAM and CIM; Process planning; Computer-aided process planning; Concurrent Engineering and Design for Manufacturing; Production Planning and Control Systems; Semester project; MRP and Capacity Planning; Factory and Inventory Control; MRP II and ERP; Lean Production and Waste in Production; Just-in-Time production systems; Autonomation and Worker Involvement; The final project.			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			30%
	• Project			20%
	• Exercises			20%
	• Case studies			10%
	• Role simulation			10%
	• Problem solving			10%
Assessment Methods	**Assessment Activity**		**Week**	**Weight (%)**
	• Attendance		15	10%
	• Activity in lecture		15	10%
	• Project		15	80%

Course resources	**Resources**		**Number**
	• Class		1
	• Moodle		1
	• Software		1
	• Projector		1
	• PC or Laptop		1
ECTS Workload	**Activity**	**Weekly hrs**	**Total workload**
	• Lectures	2	30
	• Project		55
	• Exercises		15
	• Independent learning		20
Literature/References	Basic literature: • Groover, M. P. (2018). Automation, Production Systems, and Computer-Integrated Manufacturing, Fifth Edition. Pearson. ISBN-13: 978-0134605463 Additional literature: • Hunt, V. Daniel. (1989). Computer-integrated manufacturing handbook. Chapman and Hall. ISBN-13: 978-1-4612-8874-9 • Weatherall, A. (1992). Computer Integrated Manufacturing: A total company competitive strategy, Second edition. Butterworth-Heinemann Ltd. ISBN 0 7506 0811 0 • Scheer, A. W. (1994). CIM: Computer Integrated Manufacturing, Towards the factory of the future. Springer – Verlag. ISBN -13: 978-3-642-78990-8 • Leonde, C. T. (2003). Computer Aided and Integrated Manufacturing Systems, Vol. 4. World Scientific Publishing Co. Pte. Ltd. ISBN 981-238-980-6 (Vol. 4) • Saaksvuori, A., Immonen, A. (2005). Product Lifecycle Management, Second Edition. Springer • Shtub, A., Karni, R. (2010). ERP, The Dynamics of Supply Chain and Process Management Second Edition. Springer. ISBN 978-0-387-74523-7		
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including project, activity in lectures and participation. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.		
Contact			

Course Name	**Industrial product design**			
	Type	**Semester**	**ECTS**	Code
	Mandatory (M)	6	4	
Course Lecturer **Course Assistant** **Course Tutor**				

Course Description	The course provides an overview of and introduction to the methods and processes used in the field of industrial design and in the product development process. An introduction to visualization techniques with application of computer in 2D (sketching) and 3D (modelling techniques) is given. Focus is on the design process in development of physical products and on the visualization and communication of ideas and design concepts. Product development and design processes and methods, including product specifications, concept development, engineering drawings, design for prototyping, and manufacturing.
Course Learning Outcomes	Student will be able to… • Understand and apply the engineering and product development processes from problem definition to detail design. • Generate and evaluate design concepts using appropriate tools and methods for decision-making and optimization. • Incorporate safety, quality, and reliability considerations into product design, ensuring robust and cost-effective solutions. • Collaborate effectively within design teams and utilize modeling and simulation techniques for manufacturing readiness.
Course Plan	**Weekly Plan/for 15 weeks** Introduction House-keeping rules The Engineering Design Process The Product Development Process Problem Definition and Need Identification Team Behaviour and Tools Designers and Design Teams Gathering Information Concept Generation Decision Making and Concept Selection Detail Design Modelling and Simulation Design for Manufacturing Risk, Reliability, and Safety Quality, Robust Design, and Optimization Cost Evaluation
Teaching Methods	**Teaching/Learning Activity** — **Weight (%)** • Lectures — 30% • Project — 20% • Practice — 20% • Case studies — 10% • Role simulation — 10% • Problem solving — 10%

Evaluation Methods	**Activity**	**Week**	**Weight (%)**
	Group Projects and Presentation:		20%
	Final project		20%
	Class Participation		10%
	Final Exam Test		50%

Sources & Tools	**Tools**	Quantity
	Basic Tools – Board, Marker, PCs, Software	1
	Moodle	1
	Projector	1
	Scanner	1
	Printer	1

Loads & Activities	Type of Activity	Hours per Week	**Total Load**
	Lectures	2	30
	Practical Work	1	15
	Self-Study	-	75
	Control – Test	-	-
	Total	-	120

Literature/References	Ulrich, Karl T., & Eppinger, Steven D. (2020). *Product Design and Development* (7th Edition). McGraw Hill. *ISBN:* 9781260043655 Cross, Nigel. (2011). *Engineering Design Methods: Strategies for Product Design* (4th Edition). Wiley. *ISBN:* 9780470519264 Pahl, G., Beitz, W., Feldhusen, J., & Grote, K.-H. (2007). *Engineering Design: A Systematic Approach* (3rd Edition). Springer. *ISBN:* 9781846283185
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including project, activity in lectures and participation. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.
Contact	

Course	**Design Management**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatory (M)	6	4	
Course Lecturer				

Course Assistant **Course Tutor**	
Course Description	This subject aims to equip students with the fundamentals of design management. Demonstrate an understanding of PLM concepts, particularly product data management, change management, workflows and configurations Demonstrate literacy in the application a PDM tool to support product development processes.
Course Objectives	Develop management skills enabling them to engage in innovative projects based on design as a strategic asset.
Course Learning Outcomes	On completion of this subject the student is expected to be able to: • Understand design management principles • Appreciate the role of management concepts in design • Able to apply design management principles to industrial design product • Readings from texts and selected relevant articles and publications
	Introduction to Design Management. The beginning of Design Management. Marketing meets design. Design meets marketing. Gathering customer needs, organizing and prioritizing customer needs, establishing product function, FAST method, establishing system functionality. Countering competition through design management. **Introduction to Product Life Cycle Management** Background, Overview, Need, Benefits, and Concept of Product Life Cycle, Components / Elements of PLM, Emergence of PLM, Significance of PLM, Customer Involvement,. Threads of PLM- computer aided design (CAD), engineering data management (EDM), Product data management (PDM
Teaching Methods	**Teaching/Learning Activity** — **Weight (%)** • Lectures — 40% • Seminar — 10% • Case studies — 10% • Laboratory • Numerical exercises — 20% • Role play • Problem-based learning — 10% • Study visit — 10%
Evaluation Methods	**Activity** — **Number** — **Week** — **Weight (%)** Group Projects and Presentation: — 20% Final project — 20%

	Class Participation	10%
	Final Exam Test	50%

Sources & Tools

Tools	Quantity
Basic Tools – Board, Marker, PCs	1
Moodle	1
Projector	1
Printer	1

Loads & Activities

Type of Activity	Hours per Week	**Total Load**
Lectures	2	30
Practical Work	1	15
Self-Study	-	75
Control – Test	-	-
Total	-	120

Literature/References

- Karl T. Ulrich and Steven D. Eppinger, Product Design and Development, 7th Edition, McGraw-Hill, 2019. ISBN: 978-1260043655
- Adams, J., Design Management and Strategy, McGraw-Hill. (Latest edition not available)
- Grieves, Michael, Product Lifecycle Management, 2nd Edition, McGraw-Hill, 2019. ISBN: 978-1259862046
- Antti Saaksvuori, Anselmi Immonen, Product Life Cycle Management, Springer, 1st Edition (Nov. 5, 2003). ISBN: 978-3540401324
- Stark, John, Product Lifecycle Management: Paradigm for 21st Century Product Realization, 4th Edition, Springer-Verlag, 2019. ISBN: 978-3030205740
- Burden, Rodger, PDM: Product Data Management, Resource Pub, 1st Edition, 2003. ISBN: 0970035225

Contact

Subject

Sustainable Product and Process Design

Type	**Semester**	**ECTS**	**Code**
OBLIGATORY (O)	6	4	

Course Lecturer
Course Assistant

Goals and Objectives

The focus of the course is the management of innovation processes for sustainable products, from the product to the definition of sustainable production and financial models. Using a project in which students will be asked to design and develop a product or service focused on sustainability, we will learn the processes for gathering data about customer and user needs, prioritizing that data, developing a product specification, sketching and building product prototypes, and interacting with the customer/community during product

	development. The course is intended as a very hands-on experience in the "green" product development process.
Learning Outcomes	Upon completion of this course, students will be able to: • Gain knowledge on basic theories, methodological tools and practical examples of how to implement sustainable design • Reflect on the responsibilities related to sustainable development related to his/her future professional role as a practicing designer or professional working with designers • Have knowledge of concepts, methods, values and applications in future sustainable design • Have knowledge of sustainable design and process
Course Content	The 15-week course plan will be as follows: Product development processes and organization, product planning, CAD/solid modelling, customer/user needs assessment, personas and empathetic design, concept generation, concept selection, concept development, decision analysis, concept testing, Taguchi method and experimental design, product architectures, design for variety, design for environment, life cycle assessment, design for assembly/manufacturing, prototyping, design cost, design optimization, universal design and entrepreneurship, innovation and intellectual property.
Teaching/Learning Methods	**Teaching/Learning Activity** — **Weight (%)** • Lectures — 40% • Seminar — 10% • Case studies — 10% • Laboratory • Numerical exercises — 20% • Role play • Problem-based learning — 10% • Study visit — 10%
Assessment Methods	**Assessment Activity** — **Week** — **Weight (%)** • Quiz — 20% • Group task/homework — 20% • Midterm — 30% • Final exam — 30%
Course resources	**Resources** — **Number** • Class — 1 • Moodle — 1 • Software — 1 • Projector — 1 • PC or Laptop — 1
ECTS Workload	**Activity** — **Weekly hrs** — **Total workload** • Lectures — 2 — 30 • Numerical exercises — 1 — 15 • Laboratory • Practice in industry — 10 • Independent work — 63 • Exam — 2

Literature/References	Basic literature: • Sustainable Product Design and Development By Anoop Desai, Anil Mital, 2021 Additional literature: • The Total Beauty of Sustainable Products Paperback – May 1, 2001by Edwin Datschefski (Author) • Product Design and Sustainability Strategies, Tools and Practice, By Jane Penty
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including exam, activity in lectures and participation. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.
Contact	

Subject	**Fundamentals of Biomedical Engineering**			
	Type	**Semester**	**ECTS**	**Code**
	ELECTIVE (E)	6	4	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	The course provides an introduction to several areas of Biomedical Engineering. Topics include basic biomechanics, bioinstrumentation systems, circuit elements and concepts, linear network analysis, bio-potentials, biosensors, various imaging techniques, fundamentals of bioinformatics and molecular engineering.			
Learning Outcomes	Upon successful completion of the course, the student is expected to: ● Apply course material to improve thinking, problem solving, and decision making in analysing Biomedical Engineering problems using proper assumptions and simplifications ● Gain knowledge about the mechanics, materials and operation of the human system ● Learn fundamental principles and generalizations of engineering analysis used in Biomedical Engineering			
Course Content for 15 weeks	**Course Plan** Introduction Vectors Free Body Diagrams Forces, Equilibrium Biomechanical Modelling Biomechanical Testing Techniques Biomechanical Problem-Solving Methodology Bioinstrumentation System			

	Basic Circuit Elements and Concepts Linear Network Analysis The Origin of Bio-potential Signals How Biosensors Record Signals in the Human Body Imaging Techniques Fundamentals of Bioinformatics Fundamental of Molecular Engineering			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			60%
	• Seminars			-
	• Laboratory			-
	• Case studies			20%
	• Role play			-
	• Problem-based learning			20%
	• Study visits			-
	• Work placement			-
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	-	-	-
	• Assigments	1	-	50%
	• Midterm	-	-	-
	• Final Exam	1	-	50%
Course resources	**Resources**			**Number**
	• Classroom(e.g)			1
	• PC Laboratory (e.g)			1
	• Moodle			1
	• Software			-
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	30
	• Seminars			-
	• Laboratory			-
	• Assignments		-	20
	• Independent Study		-	68

	• Exam	- 2
Literature/References	Myer Kutz, Biomedical Engineering Fundamentals, Third Edition, (2021). John D. Enderle & Joseph D. Bronzino, Introduction to Biomedical Engineering (2012).	
Ethical Standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. **Exams (50% Final)**: All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions. **Case Study Analysis (50%):** Case study analyses must reflect the student's own independent work. Collaboration, if permitted,must be properly cited. Plagiarism in case study submissions will be monitored using Turnitin. The similarity index must be below 15% for Bachelor's level and below 10% for Master's level (excluding references, quotes, and small sources).	
Contact		

Subject	**Health Care Management Automation**			
	Type	**Semester**	**ECTS**	**Code**
	ELECTIVE (E)	6	4	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	Health Care Management provides a framework for addressing management problems in health care organizations. By the end of the course, students will have been exposed to many management ideas, theories, applications and automation.			
Learning Outcomes	Upon successful completion of the course, the student is expected to: • Learn concepts and theories in health care management • Develop skills in using materials tools and/or technology central to health care management • Learn to select, use, and critically analyse current HCMA research and literature • Integrate health care management theory with real world situations for automation			
Course Content for 15 weeks	**Course Plan** Introduction An Overview of Health Care Management Leadership Management and Motivation Organizational Behaviour (OB) and Management Thinking Strategic Planning Health Care Marketing Quality Improvement Basics			

	Information Technology Financing Health Care and Health Insurance Managing Costs and Revenues Managing Healthcare Professionals The Strategic Management of Human Resources Addressing Health Disparities: Cultural Proficiency Health Care Management Automation

Teaching/Learning Methods	**Teaching/Learning Activity**	**Weight (%)**
	• Lectures	60%
	• Seminars	-
	• Laboratory	-
	• Case studies	20%
	• Role play	-
	• Problem-based learning	20%
	• Study visits	-
	• Work placement	-

Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	-	-	-
	• Assigments	1	-	50%
	• Midterm	-	-	-
	• Final Exam	1	-	50%

Course resources	**Resources**	**Number**
	• Classroom(e.g)	1
	• PC Laboratory (e.g)	1
	• Moodle	1
	• Software	-
	• Projector	1
	•	

ECTS Workload	**Activity**	**Weekly hrs**	**Total workload**
	• Lectures	2	30
	• Seminars		-
	• Laboratory		-
	• Assignments	-	20
	• Independent Study	-	68
	• Exam	-	2

Literature/References	Buchbinder, S.B., & Shanks, N.H., Introduction to Health Care Management, 4th Edition (2019). James Smith, Biomedical Engineering Step by Step: A Structured Introduction to Advancing Healthcare Technologies, (2024).
Ethical Standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. **Exams (50% Final)**: All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions.

	Case Study Analysis (50%): Case study analyses must reflect the student's own independent work. Collaboration, if permitted,must be properly cited. Plagiarism in case study submissions will be monitored using Turnitin. The similarity index must be below 15% for Bachelor's level and below 10% for Master's level (excluding references, quotes, and small sources).
Contact	

Subject	**Image Based Diagnostics in Medical Technology**			
	Type	**Semester**	**ECTS**	**Code**
	ELECTIVE (E)	6	4	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	The aim of this course is for students to gain a basic understanding of the engineering aspects of both contemporary and state-of-the-art technologies used to create medical images. In addition, the student is expected to gain an understanding of how such images are used by doctors to confirm and characterise a medical condition, as well as to assess response to treatment.			
Learning Outcomes	Upon successful completion of the course, the student is expected to: • describe the physical and biological basis of a range of contemporary and state-of-the-art medical image formation technologies • describe and apply the techniques and algorithms used in these technologies to generate/form images • compare and contrast competing image formation algorithms • implement one or more of these algorithms in software			
Course Content for 15 weeks	**Course Plan** Introduction Basic concepts of medical imaging Generation and detection of x-rays x-ray methods Computed Tomography Biological effects Ultrasound: Acoustic fundamentals, generation and detection Generation and detection Diagnostic methods Nuclear Magnetic Resonance (NMR/MRI) MRI methods Biological effects of EM fields Emerging areas in medical imaging Diagnostic value Statistical performance measures			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			60%
	• Seminars			-
	• Laboratory			-
	• Case studies			20%
	• Role play			-

	• Problem-based learning			20%
	• Study visits			-
	• Work placement			-
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	-	-	-
	• Assigments	1	-	50%
	• Midterm	-	-	-
	• Final Exam	1	-	50%
Course resources	**Resources**			**Number**
	• Classroom(e.g)			1
	• PC Laboratory (e.g)			1
	• Moodle			1
	• Software			-
	• Projector			1
	•			
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	30
	• Seminars			-
	• Laboratory			-
	• Assignments		-	20
	• Independent Study		-	68
	• Exam		-	2
Literature/References	M. Chappell, Principles of Medical Imaging - From Signals to Images, Springer 2019 Nadine Barrie Smith, Andrew Webb, Introduction to Medical Imaging: Physics, Engineering and Clinical Applications, (2010)			
Ethical Standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. **Exams (50% Final)**: All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions. **Case Study Analysis (50%):** Case study analyses must reflect the student's own independent work. Collaboration, if permitted,must be properly cited. Plagiarism in case study submissions will be monitored using Turnitin. The similarity index must be below 15% for Bachelor's level and below 10% for Master's level (excluding references, quotes, and small sources).			
Contact				

Course	**Signals and Systems**			
	Type	**Semester**	**ECTS**	**Code**

	COMPULSORY (C)	5	4
Course Lecturer **Teaching Assistant** **Course Tutor**			
Goals and objectives	This course is considered as a very important course for Mechatronics. Objectives of the course are: - that student to get familiar with the fundamental concepts of signals and systems. - that student to get familiar with the fundamental methods of analysis and synthesis, and to gain skills in their applications through numerical solving problems and simulations.		
Learning outcomes	After following this course, student should be able to: • understand the fundamental concepts of signals and systems, both continuous and discrete, and to determine their properties. • apply the fundamental methods of signals and systems in time domain. • Analyse and interpret the fundamental methods of signals and systems in frequency domain, through Fourier analysis, both continuous and discrete time domains. • understand the fundamental concepts of filtering, sampling and of signal modulations.		
Content	**Weekly plan**		**Week**
	Basic concept of signals. Signal manipulations and properties.		
	Basic concept of systems. Systems types and properties.		
	Description of linear time invariant systems (LTI) with differential and difference equations.		
	Description of continuous, linear and time invariant systems with its impulse response. Linear convolution of continuous time signals.		
	Description of discrete, linear and time invariant systems with its impulse response. Linear convolution of discrete time signals.		
	Description of continuous time periodic signals using Fourier Series. Description of continuous time non-periodic signals using Fourier Transform.		
	Frequency response of a system. General Fourier transform for continuous time signals.		
	System analysis in frequency domain. Ideal filters. Amplitude modulation and pulse amplitude modulation. Multiplexing and de-multiplexing of modulated signals.		
	Fourier Transform in discrete time domain. Frequency domain analysis of signals and systems.		
	Laplace Transform and its properties. Inverse Laplace Transform. Transfer function of continuous time systems.		

	Z Transform and its properties. Inverse Z Transform. Transfer function of discrete time systems. Solution of differential equations using Laplace Transform and of difference equations using Z Transform. Zeros, poles and stability of transfer functions.

Teaching methodology	**Activity**	**Weight (%)**
	• Lectures	50%
	• Numerical exercises	50%

Evaluation methodology	**Evaluation activity**	**Number**	**Week**	**Weight (%)**
	• First evaluation		7	30%
	• Second evaluation		13	30%
	• Final exam			40%

Note: Intermediate evaluations consists of solving numerical assignments and simulations. It is considered that the student qualifies for final exam, which consists of theoretical questions, if the student passes the minimum of 50% of the total points of all these evaluations. Otherwise, the student undergoes the two-part exam, where the first part is weighted in 60% of the final exam and which qualifies the student for the second part.

Logistics/devices	**Logistics**	**Number**
	• Class	1
	• Moodle	1
	• MATLAB/Python software	
	• Projector	1

Workload and activities	**Activity type**	**Hours/week**	**Total hours**
	• Lectures	2	24
	• Exercises	2	24
	• Individual work		50
	• Exam		2

Literature/References	Emiliano R. Martins, Essentials of Signals and Systems, (2023). Schaum's Outline of Theory and Problems of Signals and Systems", Hwei P. Hsu, 1995, McGraw-Hill.
Ethical Standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. **Exams (60% Mid-term, 40% Final)**: All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions
Contact	

Course	**Digital signal processing**			
	Type	Semester	ECTS	Code
	Elective	6	4	
Course Lecturer **Teaching Assistant** **Course Tutor**				
Goals and objectives	Deepening knowledge of discrete time signals and systems. Introduction to discrete structures. Discrete Fourier Transform, Fast Fourier Transform. Multi-rate signal processing. Digital filter design, IIR and FIR. Introduction to processing of random signals.			
Learning outcomes	After following this course, the student should be able to: • understand and apply common methods for analysis of discrete time signals and systems, in both time and frequency domain. • understand circular convolution and relate it to linear convolution. • Apply and design methods of digital filters (IIR and FIR). • understand sampling of continuous time signals and multi-rate signal processing systems.			
Content	**Weekly plan**			**Week**
	Discrete time signals and systems. Impulse response, convolution, difference equations, correlation. Discrete time Fourier transform and sampling of continuous time signals. z-Transform and transform analysis of systems. Discrete Fourier Transform (DFT). Fast Fourier Transform (FFT) Implementation of discrete time systems in simple form. Implementation of discrete time systems in lattice form. Recursive digital filters. Non-recursive digital filters. Multi-rate signal processing systems. Random signals and optimal filtering.			
Teaching methodology	**Activity**			**Weight (%)**
	• Lectures			50%
	• Numerical exercises			50%
	Evaluation activity	**Number**	**Week**	**Weight (%)**

Evaluation methodology	• First evaluation	7	25%
	• Second evaluation	13	25%
	• Design task		20%
	• Final exam		30%
	Remark: Intermediate evaluations consist of numerical assignments, while the design task requires analytical and numerical (via simulation in MATLAB) work. It is considered that the student qualifies for final exam, which consists theoretical questions, if he passes minimum 50% of the total points of all evaluations 1, 2 and 3. If the student chooses not to undergoes the evaluations 1 and 2 (optional), then the student undergoes a general exam (numerical and theoretical assignments) which weight 80% of the exam, while the design task remains 20% of the exam.		
Sources and tools of concretization	**Logistics**		**Number**
	• Class		1
	• Moodle		1
	• MATLAB/Python software		1
	• Projector		1
Workload and activities	**Type of activity**	**Hours/week**	**Total hours**
	• Lectures	2	30
	• Exercises	1	15
	• Individual work	4	73
	• Exam	2	2
Literature/References	Thomas Holton, Digital Signal Processing: Principles and Applications, (2021) Schaum's Outline of Theory and Problems of Digital Signal Processing", Monson H. Hayes, McGraw-Hill, 2011.		
Ethical Standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. **Exams (70% Mid-term, 30% Final)**: All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions.		
Contact			

<table>
<tr><td>Subject</td><td colspan="4">Sensors
<table><tr><th>Type</th><th>Semester</th><th>ECTS</th><th>Code</th></tr><tr><td>Elective</td><td>6</td><td>4</td><td></td></tr></table></td></tr>
<tr><td>Course Lecturer
Course Assistant
Course Tutor</td><td colspan="4"></td></tr>
<tr><td>Aims and Objectives</td><td colspan="4">This course equips students with the skills and competences to design and integrate advanced sensor systems with appropriate electronic interfaces, creating smart transducers and system-on-chip solutions. Students will develop practical skills in selecting, classifying, and designing sensors for various applications, including magnetic, optical, bio, chemical, radiation, electrical, and mechanical systems. The course emphasizes the integration of current sensor technologies, such as electronics, photonics, microfluidics, and novel materials, preparing students to implement innovative sensor systems that address real-world challenges effectively.</td></tr>
<tr><td>Learning Outcomes</td><td colspan="4">● Select and classify sensors for specific applications, considering their physical principles and operational characteristics.
● Integrate sensors and electronic interfaces into microprocessor-based systems, ensuring optimal performance and system compatibility.
● Analyze and mitigate sensor signal noise using appropriate hardware techniques to enhance signal accuracy and reliability.
● Design and simulate complete sensor systems or microsystems, including MEMS devices, ready for fabrication and practical implementation.</td></tr>
<tr><td>Course Content (for 15 weeks)</td><td colspan="4">Introduction
Principles of Sensing, Classification and Terminology of Sensors, Measurands.
Mechanical Sensors, Acoustic, and Magnetic Sensors
Radiation and Thermal Sensors
Chemical and Biosensors
Electronic Interface and Integrated Sensors
MEMS microsystem components
Electronic/wireless integration</td></tr>
<tr><td></td><td colspan="3">Teaching/Learning Activity</td><td>Weight (%)</td></tr>
</table>

Teaching/Learning Methods	• Lectures			70%
	• Exercises			30%
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Exercises			50%
	• Final exam	1		50%
Course resources	**Resources**			**Number**
	• Classroom			1
	• Laboratory			1
	• Moodle			1
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	30
	• Exercises		1	15
	• Self-Learning			13
	• Exams			2
Literature/References	Handbook of Modern Sensors: Physics, Designs, and Applications 5th ed. 2016 Edition by Jacob Fraden Introduction to Sensors for Electrical and Mechanical Engineers 1st Edition by Martin Novák, 2022			
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.			
Contact				

Subject	**Data Analytics and IoT**			
	Type	**Semester**	**ECTS**	**Code**
	Elective	6	4	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	The Data Analytics and IoT course aims to equip students with the necessary skills and competencies to design, develop, and implement data-driven solutions for IoT systems in mechatronic applications. The course emphasizes the integration of data analytics techniques and IoT architectures to enable intelligent decision-making, automation, and optimization in mechatronics. Students will gain hands-on experience in analyzing datasets, deploying IoT systems, and utilizing cloud platforms to collect, store, and process data in real time. By the end of this course, students will develop the ability to apply analytical methods, interpret data for actionable insights, and ensure the seamless interaction of IoT devices within industrial systems.			
Learning Outcomes	After completing the course, the students will be able to: • Analyze and process large datasets using statistical and machine learning techniques for mechatronic applications. • Design and implement IoT systems by integrating sensors, communication protocols, and data acquisition tools. • Optimize interconnected systems by integrating data analytics with IoT platforms for real-time decision-making. • Apply technical skills to solve complex problems and implement innovative IoT solutions in mechatronics.			
Course Content (for 15 weeks)	Introduction to Data Analytics and IoT Data Types and Data Acquisition IoT System Components Data Preprocessing and Visualization IoT Hardware and Networking Data Storage and Management Data Analytics Techniques IoT Security and Privacy Integration of IoT and Data Analytics Advanced IoT Applications in Mechatronics			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			70%
	• Exercises			30%

Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Exercises			30%
	• Final exam	1		70%
Course resources	**Resources**			**Number**
	• Classroom			1
	• Laboratory			
	• Moodle			1
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	30
	• Exercises		1	15
	• Self-Learning			13
	• Exams			2
Literature/References	Data Analytics 1st Edition by Ahmed Mohiuddin, Al-Sakib Khan Pathan,2020 An Introduction to IoT Analytics by Harry G. Perros, 2021 Data Analytics in the IoT Ecosystem by Dr. Vidya R, Dr. Nandoori Srikanth, Dr. Deepan, Mr. Arul N, 2024			
Ethic Code	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions.			
Contact				

Subject	**Computer Architecture**			
	Type	**Semester**	**ECTS**	**Code**
	Elective	6	4	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	The aim of this subject is to provide students with a comprehensive understanding of the architecture and organization of modern computers and how they are designed to meet the needs of mechatronics systems. Topics covered include the basics of digital logic, the structure of computer systems, processor design, memory management, input/output systems, and parallel computing. Specific learning objectives include: • Understanding the fundamental components of computer architecture • Learning how processors, memory, and I/O units interact in computer systems • Gaining insight into the principles behind optimizing computer performance • Understanding how to design systems that integrate computing power with mechatronic applications such as robotics and automation; convolutional / trellis codes; error-correction; and decoding methods.			
Learning Outcomes	Upon completion of this subject, students should be able to: Upon successful completion of the course, the student is expected to: • Understand how computers are structured and how various components interact. • Be able to describe how a CPU processes data and handles control operations. • Understand the principles behind memory hierarchies and data storage. • Analyze performance and design considerations of computer systems, including pipelining and parallel processing. • Be able to design and implement basic processors and their integration into a complete computer architecture.			
Course Content (for 15 weeks)	Introduction to Computer Architecture CPU Design and Control Unit Arithmetic Logic Unit (ALU) Design Memory Systems Input/Output Systems Pipelining and Performance Optimization Parallel and Distributed Systems Computer System Design and Integration Assembly Language and Machine-Level Programming Performance Analysis			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			60%
	• Exercises			30%
	• Problem-based learning			10%
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Laboratory Projects			40%

	• Midterm Exam	30%
	• Final exam	30%
Course resources	**Resources**	**Number**
	• Classroom	1
	• Laboratory	1
	• Moodle	1
	• Projector	1

ECTS Workload	**Activity**	**Weekly hrs**	**Total workload**
	• Lectures	2	30
	• Exercises	1	15
	• Self-Learning		73
	• Exams		2

Literature/References	• David A. Patterson, John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, 5th Edition (2013). • William Stallings, Computer Organization and Architecture: Designing for Performance, 10th Edition (2016). • Andrew S. Tanenbaum, Herbert Bos, Modern Operating Systems, 4th Edition (2014).
Ethical Standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. Exams (60% Final): All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions. Laboratory Projects (40%): Laboratory projects must reflect the student's independent work in laboratory sessions.
Contact	

Subject	**Human-Computer Interaction**			
	Type	**Semester**	**ECTS**	**Code**
	Elective	6	4	

Course Lecturer **Course Assistant** **Course Tutor**	
Aims and Objectives	The Human-Computer Interaction (HCI) course aims to equip students with the necessary skills and competencies to design, evaluate, and implement user-centered interfaces and systems in mechatronics applications. The course focuses on understanding the principles of usability, user experience (UX), and interaction design while fostering creative and analytical thinking to address complex interaction challenges. By the end of the course, students will have the ability to apply HCI principles, utilize interaction evaluation techniques, and develop intuitive, accessible, and efficient human-computer interfaces for real-world mechatronics systems.
Learning Outcomes	After completing the course, the students will be able to: • Apply fundamental principles of usability and interaction design to create user-centered systems.

	• Develop and evaluate human-computer interfaces using established UX and usability testing methods. • Design interactive systems that address accessibility, cultural considerations, and user diversity. • Integrate HCI principles into mechatronic systems to optimize human-machine collaboration.
Course Content (for 15 weeks)	Introduction to Human-Computer Interaction Understanding Users and Contexts Principles of Interaction Design Prototyping and Design Tools Usability Testing and Evaluation Accessibility in Design Interaction Paradigms and Technologies HCI for Mechatronic Systems Ethical and Cultural Aspects of HCI Project Development and Implementation

Teaching/Learning Methods	**Teaching/Learning Activity**	**Weight (%)**
	• Lectures	70%
	• Exercises	30%

Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Exercises			30%
	• Final exam	1		70%

Course resources	**Resources**	**Number**
	• Classroom	1
	• Laboratory	
	• Moodle	1
	• Projector	1

ECTS Workload	**Activity**	**Weekly hrs**	**Total workload**
	• Lectures	2	30
	• Exercises	1	15
	• Self-Learning		13
	• Exams		2

Literature/References	
	Designing Interfaces: Patterns for Effective Interaction Design 3rd Edition by Jenifer Tidwell, Charles Brewer, Aynne Valencia, 2020 Interaction Design: Beyond Human-Computer Interaction 6th Edition by Yvonne Rogers, Helen Sharp, Jennifer Preece, 2023

Ethic Code	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions.
Contact	

Subject	**Communication system engineering**			
	Type	**Semester**	**ECTS**	**Code**
	Elective	6	4	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	The aim of this subject is to develop a thorough understanding of the main concepts, techniques and performance criteria used in the analysis and design of digital communication systems. Topics include: • Source coding; data compression; entropy • Digital modulation and demodulation, with and without bandwidth constraints; signal constellations in signal vector space; M-ary signalling and probability of error calculations for AWGN channels; Nyquist's criterion, pulse shaping and equalisation; sequence detection; Viterbi's algorithm • Mutual information and channel capacity; BSC and erasure channels; Shannon bounds; channel coding; erasure coding; block codes; convolutional / trellis codes; error-correction; and decoding methods.			
Learning Outcomes	Having completed this subject the student is expected to: • Understand the various blocks that constitute a digital communication system and understand how they interrelate • Be able to qualitatively and quantitatively analyse and evaluate digital communication systems • Recognise the broad applicability of digital communication systems in society • Use software tools to analyse, design and evaluate digital communication systems			
Course Content (for 15 weeks)	Introduction Source coding Data compression			

	Digital modulation and demodulation Signal constellations in signal vector space M-ary signalling and probability of error calculations for AWGN channels Pulse shaping and equalisation Sequence detection Mutual information and channel capacity Channel coding			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			70%
	• Exercises			30%
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Exercises			50%
	• Final exam	1		50%
Course resources	**Resources**			**Number**
	• Classroom			1
	• Laboratory			
	• Moodle			1
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	30
	• Exercises		1	15
	• Self-Learning			73
	• Exams			2
Literature/References	Louis E. Frenzel, Principles of Electronic Communication Systems, (2022). Computer Networks, 5th edition. Andrew S. Tanenbaum , David J. Wetherall, Prentice Hall, 2010			
Ethical Standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any			

	form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. **Exams (50% Exercises, 50% Final)**: All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions.
Contact	

Subject	**Mobile System Technology**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatory Elective	6	4	
Course Lecturer **Course Assistants**				
Aims and Objectives	This course will cover state-of-the-art topics in wireless networking and mobile computing. The objective of the course is to introduce students to recent advances in mobile networking and sensing, with an emphasis on practical design aspects of mobile systems. We will start with introductory topics in wireless networking and mobile sensing which will cover design of today's wireless networks such as 802.11n and 802.11ac, and smartphone/wearable sensing techniques including activity and context recognition. In the second part of the course, we will cover more advanced topics including next generation multi-gigabit wireless networks (5G) such as millimeter wave (802.11ad) and visible light communication, integrated sensing paradigms including localization and RF sensing, low power networking with a focus on RFID backscatter and Internet-of-Things (IoT) devices, and networking aspects of future mobile systems such as drones and autonomous cars.			
Learning Outcomes	After completing the course, the students will have knowledge on: • Explain the foundational principles of wireless networking, including the physical and MAC layers • Apply knowledge of mobile and wearable sensing technologies • Design and evaluate low-power networking solutions			
Course Content for 15 Weeks	**Content** Wireless networking Physical layer MAC layer Mobile and wearable sensing Overview of smartphone/wearable sensors Activity recognition and healthcare Wearables overview Multi-gigabit wireless networks Next generation (5G) wireless technologies Upper Gigahertz and Terahertz wireless communications			

	Millimeter wave networking Indoor localization and RF sensing Smartphone localization Device-free sensing with radio frequency Low-power networking Backscatter communication Internet-of-Things (IoT)

Teaching/Learning Methods	**Teaching/Learning Activity**	**Weight (%)**
	Lectures	50%
	Exercises	20%
	Seminar	30%

Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Exercises			20%
	• Seminar	1		30%
	• Final Exam	1		50%

Course resources	**Resources**	**Number**
	• Classroom	1
	• Moodle	1
	• Projector	1

ECTS Workload	**Activity**	**Weekly hrs**	**Total workload**
	Lectures	2	30
	Exercises	1	15
	Seminar		30
	Self-study		43
	Final Exam		2

Ethical Standard	This course follows UBT College's Code of Ethics, requiring students to uphold academic integrity in all assessments: lectures and exercises 20%, seminars 30%, and the final exam 50%. All exams must be completed independently, without unauthorized materials or collaboration. Any form of cheating will result in immediate failure of the exam and disciplinary action. Case study analyses and projects must reflect independent work, with collaboration allowed only if explicitly stated by the instructor. Plagiarism is permitted up to 15%, and Turnitin will be used for verification. Academic dishonesty will result in serious consequences, including failing the course.
Literature/References	Martin Souter (2017), From GSM to LTE-Advanced Pro and 5G: An Introduction to Mobile Networks and Mobile Broadband, John Wiley & Sons S. Yi (2012), Radio Protocols for LTE and LTE-Advanced, Wiley Akaiwa, Yoshihiko. Introduction to digital mobile communication. John Wiley & Sons, 2015. Rodriguez, Jonathan. Fundamentals of 5G mobile networks. John Wiley & Sons, 2015. Logvinov, Vasiliy V., and Sergey M. Smolskiy. Radio receivers for systems of fixed and mobile communications. Springer International Publishing, 2022.
Contact	

Course	**Signals and Systems**			
	Type	**Semester**	**ECTS**	**Code**
	COMPULSORY (C)	5	4	
Course Lecturer **Teaching Assistant** **Course Tutor**				
Goals and objectives	This course is considered as a very important course for Mechatronics. Objectives of the course are: - that student to get familiar with the fundamental concepts of signals and systems. - that student to get familiar with the fundamental methods of analysis and synthesis, and to gain skills in their applications through numerical solving problems and simulations.			
Learning outcomes	After following this course, student should be able to: • understand the fundamental concepts of signals and systems, both continuous and discrete, and to determine their properties. • apply the fundamental methods of signals and systems in time domain. • Analyse and interpret the fundamental methods of signals and systems in frequency domain, through Fourier analysis, both continuous and discrete time domains. • understand the fundamental concepts of filtering, sampling and of signal modulations.			
Content	**Weekly plan**			**Week**
	Basic concept of signals. Signal manipulations and properties. Basic concept of systems. Systems types and properties. Description of linear time invariant systems (LTI) with differential and difference equations. Description of continuous, linear and time invariant systems with its impulse response. Linear convolution of continuous time signals. Description of discrete, linear and time invariant systems with its impulse response. Linear convolution of discrete time signals. Description of continuous time periodic signals using Fourier Series. Description of continuous time non-periodic signals using Fourier Transform. Frequency response of a system. General Fourier transform for continuous time signals. System analysis in frequency domain. Ideal filters. Amplitude modulation and pulse amplitude modulation. Multiplexing and de-multiplexing of modulated signals. Fourier Transform in discrete time domain. Frequency domain analysis of signals and systems.			

	Laplace Transform and its properties. Inverse Laplace Transform. Transfer function of continuous time systems. Z Transform and its properties. Inverse Z Transform. Transfer function of discrete time systems. Solution of differential equations using Laplace Transform and of difference equations using Z Transform. Zeros, poles and stability of transfer functions.

Teaching methodology	**Activity**	**Weight (%)**
	• Lectures	50%
	• Numerical exercises	50%

Evaluation methodology	**Evaluation activity**	**Number**	**Week**	**Weight (%)**
	• First evaluation		7	30%
	• Second evaluation		13	30%
	• Final exam			40%
	Note: Intermediate evaluations consists of solving numerical assignments and simulations. It is considered that the student qualifies for final exam, which consists of theoretical questions, if the student passes the minimum of 50% of the total points of all these evaluations. Otherwise, the student undergoes the two-part exam, where the first part is weighted in 60% of the final exam and which qualifies the student for the second part.			

Logistics/devices	**Logistics**	**Number**
	• Class	1
	• Moodle	1
	• MATLAB/Python software	
	• Projector	1

Workload and activities	**Activity type**	**Hours/week**	**Total hours**
	• Lectures	2	24
	• Exercises	2	24
	• Individual work		50
	• Exam		2

Literature/References	Emiliano R. Martins, Essentials of Signals and Systems, (2023). Schaum's Outline of Theory and Problems of Signals and Systems", Hwei P. Hsu, 1995, McGraw-Hill.
Ethical Standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. **Exams (60% Mid-term, 40% Final)**: All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions
Contact	

<table>
<tr><td>Subject</td><td colspan="4">Machine Dynamics and Control</td></tr>
<tr><td></td><td>Type</td><td>Semester</td><td>ECTS</td><td>Code</td></tr>
<tr><td></td><td>Elective (E)</td><td>6</td><td>4</td><td></td></tr>
<tr><td>Course Lecturer
Course Assistant
Course Tutor</td><td colspan="4"></td></tr>
<tr><td>Aims and Objectives</td><td colspan="4">• To provide students with a comprehensive understanding of the dynamic forces and motion in mechanical systems, including inertia, torque, and vibration.
• To develop students' ability to analyze and solve complex problems related to dynamic analysis, balancing of mechanical systems, and vibration in various mechanical applications.
• To enable students to apply principles of gyroscopic forces and governors in practical mechanical systems, such as engines, turbines, and transportation vehicles.</td></tr>
<tr><td>Learning Outcomes</td><td colspan="4">Upon the completion of this course the students will be able to
● Apply the principles of statics and dynamics to analyse mechanisms to determine joint forces and torques.
● Estimate the magnitude and position of balancing masses for unbalanced rotating and reciprocating parts.
● Compute the frequency of free and forced vibration and damping coefficient.
● Calculate the speed and lift of the governor and estimate the gyroscopic effect on automobiles, ships and airplanes.</td></tr>
<tr><td>Course Content for 15 weeks</td><td colspan="4">● Dynamic force analysis – Inertia force and Inertia torque– D Alembert’s principle –Dynamic Analysis in reciprocating engines – Gas forces – Inertia effect of connecting rod– Bearing loads – Crank shaft torque – Turning moment diagrams –Fly Wheels – Flywheels of punching presses- Dynamics of Cam- follower mechanism.
● Static and dynamic balancing – Balancing of rotating masses – Balancing a single cylinder engine – Balancing of Multi-cylinder inline, V-engines – Partial balancing in engines – Balancing of linkages – Balancing machines-Field balancing of discs and rotors
● Basic features of vibratory systems – Degrees of freedom – single degree of freedom – Free vibration– Equations of motion – Natural frequency – Types of Damping – Damped vibration– Torsional vibration of shaft – Critical speeds of shafts – Torsional vibration – Two and three rotor torsional systems.
● Response of one degree freedom systems to periodic forcing – Harmonic disturbances – Disturbance caused by unbalance – Support motion –transmissibility – Vibration isolation vibration measurement.
● Governors – Types – Centrifugal governors – Gravity controlled and spring controlled centrifugal governors – Characteristics – Effect of friction – Controlling force curves. Gyroscopes –Gyroscopic forces and torques – Gyroscopic stabilization – Gyroscopic effects in Automobiles, shipsand airplanes</td></tr>
<tr><td></td><td colspan="3">Teaching/Learning Activity</td><td>Weight (%)</td></tr>
<tr><td></td><td colspan="3">• Lectures</td><td>30%</td></tr>
<tr><td></td><td colspan="3">• Projects</td><td>20%</td></tr>
</table>

Teaching/Learning Methods	• Exercises			30%
	• Problem-based learning			20%
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	2	2	20%
	• Projects	2		40%
	• Final exam			40%
Course resources	**Resources**			**Number**
	• Class (e.g)			1
	• Laboratory (e.g)			
	• Moodle			1
	• Software MATLAB/Python			1
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	30
	• Exercises		2	30
	• Projects			20
	• Practice in the industry			2
	• Independent learning			35
	• Exams			3
Literature/References	F. B. Sayyad, "Dynamics of Machinery", TechKnowledge Publications, 2021. ISBN: 978-81-947597-7-5. S. S. Rattan, "Theory of Machines", 5th Edition, McGraw-Hill, 2019. ISBN: 978-9353166281. J. J. Uicker Jr., G. R. Pennock, and J. E. Shigley, "Theory of Machines and Mechanisms", 5th Edition, Oxford University Press, 2016. ISBN: 978-0190264482. Other material that is distributed during the course or published on the course's website (MOODLE)			
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions.			
Contact				

Subject	**Advanced Materials**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatory (M)	6	4	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	This course is intended to provide a detailed awareness of the current and emerging advanced materials and their manufacturing technology for high-performance composite components and structures, and an understanding of materials selection and the design process for effective parts manufacturing. This subject focuses on advanced materials and their engineering applications. Selected metallic, ceramic and polymer materials and their composites are analysed in the context of applications as well as CFRP (Carbon Fiber-Reinforced Plastic).			
Learning Outcomes	Students will be able to: ● Analyze properties and structures of composites, aerospace alloys, smart materials, and nanomaterials. ● Evaluate fabrication techniques such as casting, metal infiltration, and carbon fiber production. ● Characterize materials based on their microstructures, physical, and mechanical properties. ● Apply advanced materials like smart materials, nanomaterials, and PLA in engineering applications.			
Course Content	**Course Plan for 15 weeks** Introduction to advanced materials and manufacturing processes, Composite Materials: Types of metal matrices and reinforcements and their properties, bonding mechanisms, structure-property relationships, preforms, design of composites, Physical and Mechanical properties. Characterization of microstructures and macrostructures. Fabrication techniques – metal infiltration, pressure and vacuum casting methods, Carbon Fibers and Carbon Fiber-Reinforced Plastic (CFRP) process of production and their properties, Aerospace Alloys: High strength Aluminium and Magnesium alloys, Nickel and Cobalt based Superalloys, Titanium alloys, their structures, structure-property relationships, heat treatment. Directional solidification and single crystal turbine blades, Smart Materials: Concept of shape memory, crystal structure, phase transformation mechanism and characteristics, properties, classification, applications, Nano materials: properties, classification, characterization, materials behaviour, fabrication and applications, Polymers - PLA (Polylactic acid) as 3D printing material and its mechanical properties.			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			40%
	• Seminars			10%
	• Case studies			10%
	• Numerical Exercises			30%

	• Role play			-
	• Problem-based learning			10%
	• Study visits			-
	• Work placement			-
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	2	2	20%
	• Group work/homework			20%
	• Mid-term exam	1	7	30%
	• Final exam			30%
Course resources	**Resources**			**Number**
	• Class (e.g)			1
	• Laboratory (e.g)			
	• Moodle			1
	• Microsoft office			1
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	30
	• Numerical Exercises			
	• Laboratory		1	20
	• Practice in the industry			5
	• Independent learning			60
	• Exams			5
Literature/References	Jayakrishna Kandasamy, Rajyalakshmi G., & Mohamed Thariq Hameed Sultan (2023). Metal Matrix Composites: Advances in Processing Methods, Machinability Studies, and Applications. CRC Press.ISBN: 9781032385259 Suneev Anil Bansal, Virat Khanna, & Pallav Gupta (2023). Metal Matrix Composites: Properties and Applications. CRC Press.ISBN: 9781032048598 Sezgin Ersoy (2022). The Fundamentals of Metal-Matrix Composites. Nova Science Publishers. ISBN: 9781685079529			
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including project, activity in lectures and participation. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.			
Contact				

Subject	**Fatigue and Fracture Mechanics**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatory (M)	6	4	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	This course is intended to give students adequate knowledge on the concepts of estimation of the endurance and failure mechanism of components. This course aims to acquaint students with concepts and techniques for the structural integrity assessment of mechanical constructions in the presence of cracks. The course is relevant for the design of equipment taking into account fatigue and for the interpretation of the causes of structural failure ("failure analysis"). By the end of the semester, students should be capable of: - selecting procedures to assess the structural integrity of mechanical components, structures, and structural connections with cracks; - coordinating the analysis of the causes by fracture and fatigue in real cases; - to understand the relevant technical literature, including standards, codes, parts of standards and of codes associated with fracture and fatigue.			
Learning Outcomes	After studying this course, students will be able to: ● Evaluate fatigue life using stress analysis and failure design approaches. ● Understand fatigue and fracture mechanics, including crack growth and Griffith's theory. ● Assess fracture toughness using stress intensity factors and ASTM standards. ● Apply principles to design and testing of aerospace and composite structures.			
Course Content for 15 weeks	**Course Plan for 15 weeks** Introduction to fatigue of structures and components, Mean stress, notches and stress concentrations effect on fatigue life, Failure design analysis according to Haigh, Goodman, Soderberg and Gerber approach, Physical aspects of fatigue (Phase in fatigue life - Crack initiation - Crack growth - Final Fracture - Dislocations - fatigue fracture surfaces), Fracture mechanics (Strength of cracked bodies - Potential energy and surface energy - Griffith's theory), Effect of thickness on fracture toughness, Stress intensity factors for typical geometries, Fatigue design and testing, Safe life and Fail-safe design philosophies, ASTM E399 and ASTM E1820 Standard Importance of Fracture Mechanics in aerospace structures,			

	Application to composite materials and structures, Failure theories (Van Misses, Tresca, Rankline).			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			40%
	• Seminars			10%
	• Case studies			10%
	• Numerical Exercises			30%
	• Role play			-
	• Problem-based learning			10%
	• Study visits			-
	• Work placement			-
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	2	6	25%
	• Group work/homework			10%
	• Mid-term exam	1	12	25%
	• Final exam			40%
Course resources	**Resources**			**Number**
	• Class (e.g)			1
	• Laboratory (e.g)			
	• Moodle			1
	• Microsoft office – Excel for evaluation of experimental test results			1
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	30
	• Numerical Exercises		1	15
	• Laboratory			
	• Practice in the industry			10
	• Independent learning			60
	• Exams			5

Literature/References	Anderson, Ted L. (2017). Fracture Mechanics: Fundamentals and Applications (4th Edition). CRC Press.ISBN: 9781498728133 Suresh, Subra, & Zheng, Yipin. (2021). Fatigue of Materials and Structures: Fundamentals and Applications. Springer.ISBN: 9783030646711 Ramamurthy, T. S. (2020). Advanced Fracture Mechanics for Structural Materials. Wiley. ISBN: 9781119762928
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.
Contact	

Subject	**Aerospace Engineering Fundamentals**			
	Type	**Semester**	**ECTS**	**Code**
	Elective	6	4	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	• To provide students with a comprehensive understanding of aerospace engineering principles, focusing on the classification and functionality of different aerospace vehicles, including fixed-wing aircraft, rotorcraft, missiles, and space vehicles. • To develop students' ability to analyze and solve engineering challenges related to the structural components of aircraft, including the fuselage, wings, empennage, and control surfaces, and understand their role in flight dynamics. • To equip students with the knowledge to assess and apply modern propulsion systems and their significance in powering various types of aerospace vehicles. • To foster an understanding of cutting-edge aviation research initiatives, such as Clean Sky and SESAR, while addressing the sustainability challenges and future innovations in aerospace engineering.			
Learning Outcomes	Students will be abel • Identify the key areas of aerospace engineering and discuss their relevance to modern aviation activities. • Explain the challenges and initiatives in aerospace research, including Clean Sky and SESAR, aimed at sustainable and efficient aviation. • Classify different types of aerospace vehicles, including fixed-wing aircraft, rotorcraft, missiles, and space vehicles. • Describe the main components of an aircraft, including the fuselage, wings, empennage, control surfaces, and propulsion systems, and explain their functions.			
Course Content (for 15 weeks)	Introduction to Aerospace Engineering Aviation Research Agenda			

	Clean Sky and SESAR Programs Classification of Aerospace Vehicles Aircraft Structure Main Control Surfaces Aircraft Propulsion Systems Challenges in Aerospace Engineering Future Directions in Aerospace Engineering
Teaching/Learning Methods	**Teaching/Learning Activity** — **Weight (%)** • Lectures — 50% • Seminar — 30% • Exercises — 20%
Assessment Methods	**Assessment Activity** — **Number** — **Week** — **Weight (%)** • Exercises — 20% • Seminar — 30% • Final exam — 1 — 50%
Course resources	**Resources** — **Number** • Classroom — 1 • Laboratory • Moodle — 1 • Projector — 1
ECTS Workload	**Activity** — **Weekly hrs** — **Total workload** • Lectures — 2 — 30 • Exercises — 1 — 15 • Seminar — 30 • Self-Learning — 43 • Exams — 2
Literature/References	Fundamentals of Aerospace Engineering, by Killian Sullivan, (2022) Aeronautical Engineering Step by Step: Mastering the Fundamentals of Flight and Aircraft Design (Step By Step Subject Guides) Hardcover, 2024 Anderson, J. D., Introduction to Flight, 7th ed., McGraw-Hill (2011).

	Turner, M. J. L., Rocket and Spacecraft Propulsion: Principles, Practice and New Developments, 3rd ed., Springer (2009).
Ethic Code	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions.
Contact	

Subject	**Aerospace Dynamics And Systems**			
	Type	**Semester**	**ECTS**	**Code**
	Elective	6	4	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	This aerodynamics course focuses on the study of the flow of air about a body, and the "body" will be an airplane, but many of the concepts explored are relevant to a wide variety of applications from sailboats to automobiles to birds. The Aerodynamics takes learners from the fundamentals of fluid mechanics to their application in aerodynamics. Learners gain a conceptual understanding of critical fluid dynamic phenomena from boundary layers to shock waves, and develop a firm foundation in the aerodynamic methods used to analyze and design modern aircraft. The concepts learned are relevant to other areas including wind turbines, hydrodynamics, and even bird flight. The Aerodynamics is appropriate for students with a solid background in mechanics, vector calculus, and differential equations.			
Learning Outcomes	Students will be abel: ● To apply the fundamentals of aerodynamics to predict and analyse flow behaviour especially for airfoils and wings ● To quantify aerodynamic forces on airfoils and wings from a wide range of flows from subsonic to supersonic speeds ● To quantify the role viscous flows and boundary layers and how they apply to aerodynamics and flight ● To create aerodynamic models of airfoils and wings for use in the analysis of the aerodynamic forces on and motion of flight vehicles			
Course Content (for 15 weeks)	Importance of Aerodynamics: Historical Examples Aerodynamics: Classification and Practical Objectives Fundamental Aerodynamic Variables Aerodynamic Forces and Moments Center of Pressure			

	Flow Similarity Types of Flow Applied Aerodynamics: The Aerodynamic Coefficients- Their Magnitudes and Variations
Teaching/Learning Methods	**Teaching/Learning Activity** — **Weight (%)** • Lectures — 70% • Exercises — 30%
Assessment Methods	**Assessment Activity** — **Number** — **Week** — **Weight (%)** • Exercises — 20% • Final exam — 1 — 50% • Projects — 30%
Course resources	**Resources** — **Number** • Classroom — 1 • Laboratory • Moodle — 1 • Projector — 1
ECTS Workload	**Activity** — **Weekly hrs** — **Total workload** • Lectures — 2 — 30 • Exercises — 1 — 15 • Self-Learning — 13 • Exams — 2
Literature/References	Anderson Jr., John D. (2023). *Fundamentals of Aerodynamics* (7th Edition). McGraw Hill. *ISBN:* 9781264151929 Anderson, John D. (2021). *Introduction to Flight* (9th Edition). McGraw Hill. *ISBN:* 9781260226744
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions.
Contact	

Subject	**Signals And Remote Sensing Systems**				
	Type	**Semester**	**ECTS**	**Code**	
	Elective	6	4		
Course Lecturer **Course Assistant** **Course Tutor**					
Aims and Objectives	Applies radiometric and photometric measurement concepts; propagation, irradiance, radiance, radiant intensity, luminance, radiant exittance. Calibrates and characterizes remote sensing data and data analysis techniques. Covers the interaction between electromagnetic radiation and matter. Investigates the effects of the atmosphere on light propagation and remote sensing experiments. Includes laboratory exercises and inquiries to build teamwork, presentation skills and practical experiences of the technical workplace.				
Learning Outcomes	• Conduct and interpret radiometric experiments using laboratory tools, including calibration and data analysis. • Evaluate instrument capabilities by applying remote sensing and propagation concepts. • Communicate experimental results effectively, using concepts of radiation, propagation, and measurement. • Identify and solve radiometric problems collaboratively, integrating diverse approaches. • Develop a career plan aligning personal interests with remote sensing infrastructure and societal impact.				
Course Content (for 15 weeks)	Introduction to Signals and Remote Sensing Systems Information extraction from remote sensing images Radiometric Experiments and Data Analysis Remote Sensing Instrumentation Communication of Experimental Results Radiometric Problem-Solving Professional Development in Remote Sensing				
	Teaching/Learning Activity			**Weight (%)**	
	• Lectures			70%	

Teaching/Learning Methods	• Exercises			30%	
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**	
	• Exercises			30%	
	• Final exam	1		70%	
Course resources	**Resources**			**Number**	
	• Classroom			1	
	• Laboratory				
	• Moodle			1	
	• Projector			1	
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**	
	• Lectures		2	30	
	• Exercises		1	15	
	• Self-Learning			13	
	• Exams			2	
Literature/References	Richards, John A., & Xiuping Jia (2023). Remote Sensing Digital Image Analysis: An Introduction (6th Edition). Springer. ISBN: 9783031283193 Schott, John R. (2021). *Remote Sensing: The Image Chain Approach* (3rd Edition). Oxford University Press. *ISBN:* 9780197579104 Campbell, James B., & Wynne, Randolph H. (2022). Introduction to Remote Sensing (6th Edition). Guilford Press. ISBN: 9781462549047				
Contact					

<table>
<tr><td>Subject</td><td colspan="4">Vehicle Dynamic
<table><tr><th>Type</th><th>Semester</th><th>ECTS</th><th>Code</th></tr><tr><td>OBLIGATORY (O)</td><td>6</td><td>4</td><td></td></tr></table></td></tr>
<tr><td>Course Lecturer
Course Assistant
Course Tutor</td><td colspan="4"></td></tr>
<tr><td>Aims and Objectives</td><td colspan="4">During this quarter, you should:
Develop an understanding of the fundamental dynamic considerations that influence the design of ground vehicles and vehicle control systems.
Use the example of the automobile to investigate modeling dynamic systems at various levels of abstraction.
Explore the tradeoffs between completeness and simplicity when choosing an appropriate level of modeling abstraction.</td></tr>
<tr><td>Learning Outcomes</td><td colspan="4">At the end of the course the students should be able to
● Formulate simple but accurate dynamic models for automotive longitudinal, lateral and ride quality
● Design, implement and analyse traction and braking controls,
● Assess the stability of dynamic systems using differential equation theory, apply frequency-response methods to assess system response to external disturbances, sensor noise and parameter variations.
● Design, implement and analyse state-estimation algorithms,
● Develop and implement accurate dynamic models using simulation tools, ensuring correct system behavior and performance evaluation.</td></tr>
<tr><td></td><td colspan="4">Basic Knowledge of Vehicle System Dynamics
Lateral Vehicle Dynamics
Steering Control for Automated Lane Keeping
Longitudinal Vehicle Dynamics
Introduction to Longitudinal Control
Adaptive Cruise Control
Longitudinal Control for Vehicle Platoons
Electronic Stability Control
Mean Value Modeling of SI and Diesel Engines
Design and Analysis of Passive Automotive Suspensions
Active Automotive Suspensions
Semi-Active Suspensions
Lateral and Longitudinal Tire Forces
Tire-Road Friction Measurement on Highway Vehicles
Roll Dynamics and Rollover Prevention</td></tr>
</table>

	Dynamics and Control of Hybrid Gas Electric Vehicles			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			40%
	• Seminars			15%
	• Case studies			15%
	• Numerical Exercises			20%
	• Role play			-
	• Problem-based learning			10%
	• Study visits			-
	• Work placement			-
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	2	2	20%
	• Group work/homework			20%
	• Mid-term exam	1	7	30%
	• Final exam			30%
Course resources	**Resources**			**Number**
	• Class (e.g)			1
	• Laboratory (e.g)			1
	• Moodle			1
	• Softueri MATLAB /SIMULINK, Working Model 2D or Python			1
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	30
	• Numerical Exercises		1	15
	• Laboratory			0
	• Practice in the industry			10
	• Independent learning			63
	• Exams			2
Literature/References	Fundamentals of Vehicle Dynamics By Thomas D. Gillespie · 2021 Vehicle Dynamics and Control (Mechanical Engineering Series) 1st Edition by Rajesh Rajamani. 2012 Vehicle Dynamics: Theory and Application, by Reza N. Jazar, 2009			

	Vehicle Dynamics, Stability, and Control, Second Edition (Dekker Mechanical Engineering), Dean Karnopp, 2013
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions.
Contact	

Subject	**Electrical And Hybrid Vehicle**			
	Type	**Semester**	**ECTS**	**Code**
	Elective	6	4	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	• Explain the basics of electric and hybrid electric vehicles, their architecture, technologies and fundamentals. • Explain plug – in hybrid electric vehicle architecture, design and component sizing and the power electronics devices used in hybrid electric vehicles. • Analyze various electric drives suitable for hybrid electric vehicles. Discuss different energy storage technologies used for hybrid electric vehicles and their control. • Demonstrate different configurations of electric vehicles and its components, hybrid vehicle configuration by different techniques, sizing of components and design optimization and energy management.			
Learning Outcomes	After completing the course, the students will be able to: • Explain the basics of electric and hybrid electric vehicles, their architecture, technologies and fundamentals. • Analyze the use of different power electronics devices and electrical machines in hybrid electric vehicles.			

	• Explain the use of different energy storage devices used for hybrid electric vehicles, their technologies and control and select appropriate technology • Interpret working of different configurations of electric vehicles and its components, hybrid vehicle configuration, performance analysis and Energy Management strategies in HEVs. • Design and develop the electric propulsion unit and its control for hybrid electric vehicles.			
Course Content (for 15 weeks)	Introduction to Electric and Hybrid Electric Vehicles Power Electronics in Hybrid Electric Vehicles Electrical Machines for EV and HEV Energy Storage Technologies and Control Configurations and Components of Electric and Hybrid Vehicles Energy Management Strategies in Hybrid Electric Vehicles Design and Development of Electric Propulsion Systems Advanced Topics and Future Trends			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			70%
	• Exercises			30%
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Exercises			30%
	• Final exam	1		70%
Course resources	**Resources**			**Number**
	• Classroom			1
	• Laboratory			
	• Moodle			1
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	30
	• Exercises		1	15

	• Self-Learning	13
	• Exams	2
Literature/References	Electric and Hybrid Vehicles 3rd Edition by Tom Denton (Author), Hayley Pells (Author) Modern Electric Hybrid & Fuel Cell Vehic Paperback – January 1, 2018, by Kambiz Ebrahimi (Author) Light Duty Hybrid and Electric Vehicles (Master Automotive Technician) by Dr. Mark L Quarto (Author), Nicholas Goodnight (Author)	
Ethic Code	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions.	
Contact		

Subject	**Automotive Technology**			
	Type	**Semester**	**ECTS**	**Code**
	OBLIGATORY (O)	6	4	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	The course aims to provide students with a comprehensive understanding of the key systems and technologies used in modern vehicles. It focuses on the mechanical, electrical, and electronic systems that contribute to vehicle performance, safety, and efficiency. The course also aims to familiarize students with advancements in automotive manufacturing technologies and future trends such as autonomous driving and smart vehicle technologies			
Learning Outcomes	At the end of the course the students should be able to ● Explain the fundamental components and systems of modern automotive vehicles, including internal combustion engines, transmission systems, braking systems, and suspension systems. ● Analyze the operational principles of different automotive systems (such as drivetrain, exhaust, and cooling systems) and their roles in vehicle performance and safety. ● Evaluate the integration of mechanical, electrical, and electronic systems in automotive technology, focusing on how different subsystems (e.g., engine management, fuel injection) work together for optimal vehicle performance. ● Assess advancements in automotive manufacturing technologies, including automation in production processes, quality control methods, and the use of advanced materials in automotive design. ● Identify key trends and future innovations in automotive technology, including autonomous driving technologies, vehicle-to-vehicle communication, and smart vehicle technologies.			
Course content for 15 weeks	Introduction to Automotive Technology Internal Combustion Engine (ICE) Fundamentals			

	Transmission Systems Braking Systems Suspension Systems Drivetrain and Exhaust Systems Cooling and Lubrication Systems Midterm Review and Exam Electrical Systems in Automobiles Engine Management Systems Advancements in Manufacturing Technologies Future Automotive Technologies: Autonomous Vehicles Smart and Connected Vehicles			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			40%
	• Seminars			15%
	• Case studies			15%
	• Numerical Exercises			20%
	• Role play			-
	• Problem-based learning			10%
	• Study visits			-
	• Work placement			-
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	2	2	20%
	• Group work/homework			20%
	• Mid-term exam	1	7	30%
	• Final exam			30%
Course resources	**Resources**			**Number**
	• Class (e.g)			1
	• Laboratory (e.g)			1
	• Moodle			1
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	30
	• Numerical Exercises		1	15

	• Laboratory	0
	• Practice in the industry	10
	• Independent learning	63
	• Exams	2
Literature/References	Automotive Systems: Principles and Practice, Tom Denton, Botuar: 2021 Automotive Embedded Systems and Software: Design and Developmen, Puran Singh, 2022 Future Automotive Fuels and Energy Systems, Mohamed El-Sayed, 2023	
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions.	
Contact		

Subject	**Quality Management**			
	Type	**Semester**	**ECTS**	**Code**
	Elective (E)	6	4	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	The course is designed to provide basic concepts of quality management for engineers. Quality in engineering focuses on making sure products and processes are designed, developed, and made to meet or previously set expectations and requirements. Quality management in engineering deals with determined principles and practice of product and process quality assurance and control. This course covers quality issues such as: TQM, JIT, tools and techniques of quality, management, Six-Sigma quality management principles, Quality management systems, Quality management standards according to ISO with focus on IEEE technology standards.			
Learning Outcomes	**Upon completion of this module, engineering students will be capable to:** ● Apply quality management tools and techniques to product and process development in engineering. ● Evaluate quality management systems and standards, including Lean Six Sigma and predictive maintenance.			

	• Analyze the costs and benefits of quality management and propose improvements for production efficiency. • Solve real-world quality management challenges using case studies and software tools.
Course Content **15 weeks**	**Course Plan** — **Week** Introduction to quality management Essentials of quality management: tools and techniques Total Quality Management approach Quality management in product development Quality management in process development and production The cost and benefits of quality management Mid-term exam Quality management and predictive maintenance in engineering Quality management systems Lean Six Sigma quality management Quality management standards-! Quality management standards-!! Case Studies / Problems and solutions in quality management Software quality management
Teaching/Learning Methods	**Teaching/Learning Activity** — **Weight (%)** • Lectures — 50% • Seminars — 20% • Practice — 10% • Case studies — 10% • Role play — - • Problem-based learning — 10% • Study visits — - • Work placement — -
Assessment Methods	**Assessment Activity** — **Number** — **Week** — **Weight (%)** • Quiz — 2 — 5,10,15 — 15% • Group work/project — 1 — 20% • Mid-term exam — 1 — 15% • Final exam — 1 — 50%

Course resources	**Resources**		**Number**
	• Class (e.g)		1
	• Laboratory (e.g)		1
	• Moodle		1
	• Softueri MATLAB/SPSS/Python		1
	• Projector		1
	•		
ECTS Workload	**Activity**	**Weekly hrs**	**Total workload**
	• Lectures	2	30
	• Exercises	1	15
	• Seminars		16
	• Laboratory	2	10
	• Practice in the industry		2
	• Independent learning		45
	• Exams		2
Literature/References	Gunjan V.K, Diaz, V.G., Cordona M., Solanki K.V. (2020) ICICCT 2019 – System Reliability, Quality Control, Safety, Maintenance and Management: Applications to Electrical, Electronics and Computer Science and Engineering. Springer. Lim, J.S. (2020). *Quality Management in Engineering: A scientific and systematic approach.* CRC Press Franchetti, Matthew John. (2021). *Lean Six Sigma for Engineers and Managers*. CRC Press. *ISBN:* 9781138613826		
Contact			

Subject	**Logistics and Production Systems Management**			
	Type	**Semester**	**ECTS**	**Code**
	OBLIGATORY (O)	6	4	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	The aim of the course is to give a fundamental understanding of manufacturing planning and control. The student shall become familiar with manufacturing planning and control terminology and concepts and be able to apply some basic models and methods for planning and controlling material flows. Further the course aims to introduce the fundamental principles for Lean production.			
Learning Outcomes	Learning outcomes (after completion of the course the student should be able to): • Analyze production systems to optimize efficiency. • Apply forecasting and planning methods in logistics. • Use Lean tools to improve production processes. • Design sustainable supply chain strategies.			

Course Content for 15 weeks	The lectures deal with: the production task and the task and goal for production logistics efficiency variables production systems line balancing ABC-classification inventory management Sales and operation planning, master planning, materials planning and shop floor scheduling materials planning methods quantitative forecast methods customer and supplier relationships circular economy and closed-loop supply chains principles for Lean production and the Lean tools 5S, visual management, standardized work, value stream mapping, kanban, SMED, Kaizen and PDCA			
Teaching/Learning Methods	**Teaching/Learning Activity**			**Weight (%)**
	• Lectures			40%
	• Seminars			10%
	• Case studies			10%
	• Numerical Exercises			10%
	• Role play			-
	• Problem-based learning			20%
	• Study visits			10%
	• Work placement			-
Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	2	2	20%
	• Seminars			20%
	• Mid-term exam	1	7	30%
	• Final exam			30%
Course resources	**Resources**			**Number**
	• Class (e.g)			1
	• Laboratory (e.g)			
	• Moodle			1
	• Softueri			1
	• Projector			1
ECTS Workload	**Activity**		**Weekly hrs**	**Total workload**
	• Lectures		2	30
	• Numerical Exercises		1	15
	• Project Seminar			20
	• Practice in the industry			8

	• Independent learning 42 • Exams 5
Literature/References	Chopra, Sunil. (2023). Supply Chain Management: Strategy, Planning, and Operation. Pearson. ISBN: 9780134857727 Christopher, Martin. (2022). Logistics and Supply Chain Management (6th Edition). Pearson. ISBN: 9781292363375 Heizer, Jay, & Render, Barry. (2023). Operations Management: Sustainability and Supply Chain Management (14th Edition). Pearson. ISBN: 9780137556597
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including final and mid-term exams, case study analyses, class participation, and debates. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies. Exams: All mid-term and final exams must be completed independently without the use of unauthorized materials or collaboration. Cheating, such as using external aids, copying from others, or any form of misconduct during the exams, will result in immediate failure of the exam and further disciplinary actions.
Contact	

Subject	**Management Information Systems**			
	Type	**Semester**	**ECTS**	**Code**
	Mandatory (M)	6	4	
Course Lecturer **Course Assistant** **Course Tutor**				
Aims and Objectives	Students acquire the basic knowledge and skills needed to effectively utilize information systems and technology in support of organizational strategy. Topics include an introduction to information systems in organizations; strategy and information systems leadership; databases and data management; information networks; the Internet and social media; enterprise resource planning and business applications; e-business; wireless and mobile technology; knowledge management; developing and implementing information systems; security and information systems auditing; information ethics and privacy; and practical skills using operating systems, word processing and spreadsheet software.			
Learning Outcomes	After successfully completing this course, you will be able to: ● Explain the role of information systems in organizational decision-making and business processes. ● Apply business intelligence and data management techniques to support value-driven operations. ● Analyze ethical and security concerns in the use of information systems. ● Design and evaluate technological solutions, including databases and enterprise applications, for business communication and project management.			
Course Content for 15 weeks	The lectures deal with: Introduction to Information Systems in Organizations Decision-Making and Value-Driven Business Processes			

	E-Business: Enhancing Electronic Business Value Ethics and Information Security in MIS Sustainable Technological Infrastructures Data and Business Intelligence Applications Networks and Mobile Business Solutions Enterprise Applications for Business Communication Systems Development and Project Management Practices Fundamentals of Hardware and Software Networks and Telecommunications Basics Designing Databases and Exploring Emerging Technologies

Teaching/Learning Methods	**Teaching/Learning Activity**	**Weight (%)**
	• Lectures	40%
	• Seminars	10%
	• Case studies	20%
	• Role play	-
	• Problem-based learning	20%
	• Study visits	10%
	• Work placement	-

Assessment Methods	**Assessment Activity**	**Number**	**Week**	**Weight (%)**
	• Quiz	2	2	20%
	• Seminars			20%
	• Mid-term exam	1	7	30%
	• Final exam			30%

Course resources	**Resources**	**Number**
	• Class (e.g)	1
	• Laboratory (e.g)	
	• Moodle	1
	• Softueri	1
	• Projector	1

ECTS Workload	**Activity**	**Weekly hrs**	**Total workload**
	• Lectures	2	30
	• Exercises	1	15
	• Project Seminar		20
	• Practice in the industry		8

	• Independent learning 45 • Exams 2
Literature/References	• Laudon, Kenneth C., & Laudon, Jane P. (2020). Management Information Systems: Managing the Digital Firm (17th Edition). Pearson. ISBN: 9780136509846 • Bélanger, France, Van Slyke, Craig, & Crossler, Robert E. (2019). Information Systems for Business: An Experiential Approach (2nd Edition). Prospect Press. ISBN: 9781943153435 • Bocij, Paul, Greasley, Andrew, & Hickie, Simon. (2019). Business Information Systems: Technology, Development and Management for the Modern Business (6th Edition). Pearson. ISBN: 9781292251240
Ethical standards	This course follows UBT College's Code of Ethics, requiring all students to uphold academic integrity in all assessments, including exam, activity in lectures and participation. Any form of cheating, plagiarism, or academic dishonesty will result in serious consequences, including potential failure in the assessment or course, as well as disciplinary actions in line with UBT's policies.
Contact	