CASIMIR PULASKI UNIVERSITY OF RADOM

Erasmus+

SYLLABUS

Title of course:	**New Engineering Materials**	
Semester (year)	Autumn/Spring (2023/2024)	
Study level	Bachelor	
ECTS Credits	2	
Teaching methods:	Lecture/Self-study	
Course topics	Nanomaterials and nanofabrication methods. Materials and systems mimicking nature (Biomimetic materials, Smart materials and systems). Materials for information storage and transmission. Polymer composites and nanocomposites. Carbon-carbon composites. Shape memory alloys. Functionally Gradient Materials. Materials for Microelectromechanical Systems and Fuel Cells. Maraging steels, processing and applications. 3D printing of metals. Environmental issues related to new materials	
Grading policy	Final test – average marks from partial questions	
References	1. E. S. Gevorkyan, M. Rucki, V. P. Nerubatskyi, W. Żurowski, Z. Siemiątkowski, D. Morozow and A. Kharatyan. Remanufacturing and Advanced Machining Processes for New Materials and Components. Taylor&Francis: New York, 2022. https://doi.org/10.1201/9781003218654 (Open Access financed by MEiN) 2. M. Schwartz, New Materials, Processes, and Methods Technology. CRC Press: Boca Raton 2010. 3. Shackelford J.F.: Materials sciences for Engineers. Pearson: Upper Saddle River 2005	
Prerequisites	Obligatory	English, CEFR level B1 or higher
	Recommended	Completed courses on:Materials Sciences
Teacher	**Mirosław Rucki, Associate Professor**	
	Faculty of Mechanical Engineering	
	Location	ul. Stasieckiego 54-B1, p. 310, 26-600 Radom
	E-mail	m.rucki@uthrad.pl
	phone	(+ 48) 48 361 7697
Tuition fees	do not apply for EU/EEA citizens or exchange students	

CASIMIR PULASKI UNIVERSITY OF RADOM

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SYLLABUS

Title of course:	**Surface Engineering**	
Semester (year)	Autumn/Spring (2023/2024)	
Study level	Bachelor	
ECTS Credits	2	
Teaching methods:	Lecture/~~project/laboratory~~	
Course topics	Material degradation and surface integrity. Challenges and role of surface engineering. Sciences applied to surface engineering. Solid body surface. Surface layers and coatings. Coating techniques. Non-conventional enhancement of the surface layers. Gradient properties of coatings and surface layers. Surface engineering for modern materials. Future developments of surface engineering.	
Grading policy	Final test – average marks from partial questions	
References	1. A.W. Batchelor, L.N. Lam, M. Chandrasekaran, Materials Degradation and Its Control by Surface Engineering. Imperial College Press: London 2011. 2. R.S. Walia et al. (Eds.), Surface Engineering: Methods and Applications. CRC Press: Boca Raton 2023. 3. K. Gupta, Surface Engineering for Modern Materials. Springer: Cham 2020. 4. M.I. Baraton, I.V. Uvarova, Functional Gradient Materials and Surface Layers Prepared by Fine Particles Technology. Springer: Dordrecht 2001. 5. C.S. Kumar, F.D. Fernandes, Thin-Films for Machining Difficult-to-Cut Materials. CRC Press: Boca Raton 2023.	
Prerequisites	Obligatory	English, CEFR level B1 or higher
	Recommended	Completed courses on: Materials Sciences
Teacher	**Mirosław Rucki, Associate Professor**	
	Faculty of Mechanical Engineering	
	Location	ul. Stasieckiego 54-B1, p. 310, 26-600 Radom
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Tuition fees	do not apply for EU/EEA citizens or exchange students	

CASIMIR PULASKI UNIVERSITY OF RADOM

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SYLLABUS

Title of course:	**Metrology and Measurement Systems**	
Semester (year)	Autumn/Spring (2023/2024)	
Study level	Bachelor	
ECTS Credits	2	
Teaching methods:	Lecture/Self-study	
Course topics	Measurement, units and traceability. Measuring methods, tools and devices. Metrological characteristics. Uncertainty estimation. Analysis of industrial measurement systems (repeatability, reproducibility, gauge capacity).	
Grading policy	Final test – average marks from partial questions	
References	1. W. Nawrocki, Measurement systems and sensors. Artech House: London 2016. 2. S. Mekid, Metrology and Instrumentation. Wiley: 2022. 3. J. Sładek, Coordinate Metrology: Accuracy of Systems and Measurements, Springer: 2016 4. H.A. Wade (Ed.), The ASQ Metrology: Handbook. ASQ excellence: Milwaukee 2022.	
Prerequisites	Obligatory	English, CEFR level B1 or higher
	Recommended	Completed courses on: Mathematics and Physics
Teacher	**Mirosław Rucki, Associate Professor**	
	Faculty of Mechanical Engineering	
	Location	ul. Stasieckiego 54-B1, p. 310, 26-600 Radom
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Tuition fees	do not apply for EU/EEA citizens or exchange students	

CASIMIR PULASKI UNIVERSITY OF RADOM

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SYLLABUS

Title of course:	**STRENGTH OF MATERIALS**	
Semester (year)	Autumn/Spring (2023/2024)	
Study level	Bachelor	
ECTS Credits	7	
Teaching methods:	Lecture/exercise/laboratory	
Course topics	Fundamental concepts of strength of material. This course has two specific goals: to introduce students to concepts of stresses and strain; shearing force and bending; as well as torsion and deflection of different structural elements and to develop theoretical and practical skills relevant to the areas mentioned above.	
Grading policy	Positive result of the multiple-choice test	
References	1. Timoshenko S.: Strength of Materials, 3rd edition. Krieger Publishing Company, 1976 2. Hibbeler, R.C.: Statics and Mechanics of Materials, SI Edition. PrenticeHall, 2004 3. Mott, Robert L.: Applied Strength of Materials, 4th edition. PrenticeHall, 2002	
Prerequisites	Obligatory	English, CEFR level B1 or higher
	Recommended	Completed courses on: mathematics and mechanics
Teacher	**OLEJARCZYK KRZYSZTOF, Ph.D**	
	Faculty of Mechanical Engineering	
	Location	ul. Stasieckiego 54, room 306
	E-mail	k.olejarczyk@uthrad.pl
	phone	(+ 48) 48 361 71 16
Tuition fees	do not apply for EU/EEA citizens or exchange students	

CASIMIR PULASKI UNIVERSITY OF RADOM

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SYLLABUS

Title of course:	**VEHICLES DIAGNOSTIC**	
Semester (year)	Autumn/Spring (2023/2024)	
Study level	Bachelor	
ECTS Credits	3	
Teaching methods:	Lecture/exercise/laboratory	
Course topics	European On-Board Diagnostic. Gas analysis of the internal combustion engines. Catalytic converter and oxygen sensors. Diagnostics of vehicle brakes and wheel suspension. The wheel geometry measurements. Diagnostic of selected sensors. Fuel and ignition system. Lead – acid battery testing. Common Rail testing. Vehicle safety systems diagnostic.	
Grading policy	Positive result of the multiple-choice test	
References	1. Al Santini: OBD-II: Functions, Monitors and Diagnostic Techniques (online in https://books.google.pl) 2. A. W.M. Bonnick: Vehicle Electric System and fault Diagnosis. (online in https://books.google.pl) 3. C.H. Bartholomew: Catalyst deactivation 1997. (online in https://books.google.pl) 4. K. Reif: Brakes, Brake Control and Driver Assistance Systems. (online in https://books.google.pl)	
Prerequisites	Obligatory	English, CEFR level B1 or higher
	Recommended	Completed courses on: mathematics and mechanics
Teacher	**KRZYSZTOF GÓRSKI, Associate Professor**	
	Faculty of Mechanical Engineering	
	Location	ul. Chrobrego 54, room 50
	E-mail	krzysztof.gorski@uthrad.pl
	phone	(+ 48) 48 361 76 58
Tuition fees	do not apply for EU/EEA citizens or exchange students	

CASIMIR PULASKI UNIVERSITY OF RADOM

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SYLLABUS

Title of course:	**Biofuels for Internal Combustion Engines**	
Semester (year)	Autumn/Spring (2023/2024)	
Study level	Bachelor	
ECTS Credits	3	
Teaching methods:	Lecture/exercise/laboratory	
Course topics	Historical background of biofuels. Biorenewable eneregy sources: plant oils, alcohols, ethers. Physicochemical properties of biofuels for ICE. Benefits and disadventages of biofuels. Technologies of biofuels production. Fundamentals of biofuels combustion processes in the ICE. Promotion of biofuels – EU policy. Development of biofuels market.	
Grading policy	Positive result of the multiple-choice test	
References	1. IRENA (2019), Advanced biofuels. What holds them back? International Renewable Energy Agency, Abu Dhabi. 2. Ayhan Demirbas. Biofuels. Securing the Planet's Future Energy Needs. Springer 2009. 3. Dwight Tomes, Prakash Lakshmanan, David Songstad. Global Impact on Renewable Energy, Production Agriculture, and Technological Advancements. Springer 2011. 4. Directive 2009/30/EC of the European Parliament. L 140/88 5. Standards: ISO EN 14214, ISO EN 590	
Prerequisites	Obligatory	English, CEFR level B1 or higher
	Recommended	Completed courses on: mathematics and mechanics
Teacher	**KRZYSZTOF GÓRSKI, Associate Professor**	
	Faculty of Mechanical Engineering	
	Location	ul. Chrobrego 54, room 50
	E-mail	krzysztof.gorski@uthrad.pl
	phone	(+ 48) 48 361 76 58
Tuition fees	do not apply for EU/EEA citizens or exchange students	

CASIMIR PULASKI UNIVERSITY OF RADOM

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SYLLABUS

Title of course:	**Internal Combustion Engines**	
Semester (year)	Autumn/Spring (2023/2024)	
Study level	Bachelor	
ECTS Credits	5	
Teaching methods:	Lecture/exercise/laboratory	
Course topics	Basic parameters and performance of IC engines (power and mechanical efficiency, mean effective pressure and torque, volumetric efficiency, fuel-air ratio, specific fuel consumption, power and mechanical efficiency). Engine characteristics (speed, load and regulation characteristics). Measurement of exhaust emission (HC, methane, non-methane, CO, NOx, PM). Combustion process examination (cylinder pressure, heat release, thermal efficiency). Heat balance of IC engine. Alternative fuelling of IC engine (dual fuel operation of CI engine).	
Grading policy	Positive result of the multiple-choice test	
References	1. A.J. Martyr and M.A. Plint: Engine Testing (Third Edition) Theory and Practice. ISBN: 978-0-7506-8439-2 http://www.sciencedirect.com/science/book/9780750684392 2. John B. Heywood: Internal Combustion Engine Fundamentals 3. Günter P. Merker, Christian Schwarz, Gunnar Stiesch, Frank Otto Simulating Combustion Simulation of combustion and pollutant formation for engine-development ISBN 10 3-540-25161-8 Berlin Heidelberg New York	
Prerequisites	Obligatory	English, CEFR level B1 or higher
	Recommended	Completed courses on: mathematics and mechanics
Teacher	**Tomasz Skrzek, PhD**	
	Faculty of Mechanical Engineering	
	Location	ul. Chrobrego 54, room 113
	E-mail	t.skrzek@uthrad.pl
	phone	(+ 48) 48 361 76 58
Tuition fees	do not apply for EU/EEA citizens or exchange students	

CASIMIR PULASKI UNIVERSITY OF RADOM

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SYLLABUS

Title of course:	**Databases**	
Semester (year)	Autumn/Spring (2023/2024)	
Study level	Bachelor	
ECTS Credits	5	
Teaching methods:	Seminar/Project/Self-study	
Course topics	Basic concepts of database. Object oriented and entity-relationship model. Relational data model. Introduction to sql. Sql data definition and manipulation language. Developing the database application. Database project.	
Grading policy	Positive result of the multiple-choice test and positive result of project	
References	1. Hektor Garcia-Molina, Jeffrey D. Ullman, Jennifer D. Widom, Database Systems: The Complete Book. Prentice Hall. 2. Narayan Umanath, Richard Scamell, Data Modeling and Database Design. Delmar. 3. Gavin Powell, Beginning Database Design. Wiley. 4. Paul Wilton, John Colby, Beginning SQL. Wiley. 5. Peter Rob, Carlos Coronel, Database Systems: Design, Implementation, and Management, Seventh Edition. Course Technology.	
Prerequisites	Obligatory	English, CEFR level B1 or higher
	Recommended	Completed courses on: mathematics
Teacher	**Michał PAJĄK, Associate Professor**	
	Faculty of Mechanical Engineering	
	Location	ul. Stasieckiego 54, room 118
	E-mail	m.pajak@uthrad.pl
	phone	(+ 48) 48 361 71 49
Tuition fees	do not apply for EU/EEA citizens or exchange students	

CASIMIR PULASKI UNIVERSITY OF RADOM

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SYLLABUS

Title of course:	**Theory of Operation and Maintenance of Technical Systems**	
Semester (year)	Autumn/Spring (2023/2024)	
Study level	Bachelor	
ECTS Credits	3	
Teaching methods:	Seminar/ Self-study	
Course topics	Phases of machine live-cycle. Basis of system theory. Controlled processes of the operation and maintenance phase. Tribological wearing. Non-tribological wearing. operational potential. Operational position of the technical system. Operation and maintenance strategies.	
Grading policy	Positive result of the multiple-choice test	
References	1. Lindley R. Higgins, R. Keith Mobley, Maintenance Engineering Handbook, Seventh Edition. 2. Donella Meadow, Thinking in Systems. Chelsea Green Publishing. 3. http://www.corrosion-doctors.org/modules. 4. Mehadaven B., Operation Management Theory and Practice. Pearson.	
Prerequisites	Obligatory	English, CEFR level B1 or higher
	Recommended	Completed courses on: Physics
Teacher	**Michał PAJĄK, Associate Professor**	
	Faculty of Mechanical Engineering	
	Location	ul. Stasieckiego 54, room 118
	E-mail	m.pajak@uthrad.pl
	phone	(+ 48) 48 361 71 49
Tuition fees	do not apply for EU/EEA citizens or exchange students	

CASIMIR PULASKI UNIVERSITY OF RADOM

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SYLLABUS

Title of course:	**Fundamentals of Technical Thermodynamics**	
Semester (year)	Autumn/Spring (2023/2024)	
Study level	Bachelor	
ECTS Credits	6	
Teaching methods:	Lectures / Seminars / Laboratories / Self-study	
Course topics	Basic terms; Thermodynamic state; Zeroth thermodynamics law; Thermal equation of state; Thermodynamic process; Conservation of the substance amount; I thermodynamics law; Energy of the system; Mechanical work; Energy of the stream; Heat; The balance equation of the thermodynamic medium change; Calorific state equation; II thermodynamics law; Irreversibility of processes; Entropy; Increase in entropy principle; Heat engines; Exergy; Processes of ideal gas; Humid gas – air conditioning; Thermodynamic cycles; Isochoric process analysis; Isothermal process - Boyle - Mariotte law verification; Air Humidity; Isobaric process analysis; Viscosity of liquids; High pressure measurement; Recknagel manometer calibration; Thermocouple calibration; Resistance thermometer characteristic; Flash point determination – Penskey-Martens apparatus; Moisture of solid fuels.	
Grading policy	Positive result of the examination	
References	1. Thermodynamics: An Engineering Approach by YunusCengel, Michael Boles, McGraw-Hill Education, 2014 2. Fundamentals of Engineering Thermodynamics by Michael J. Moran, Howard N. Shapiro, Daisie D. Boettner, Margaret B. Bailey, Wiley, 2018 3. Thermodynamics For Dummies by Mike Pauken, For Dummies, 2011 4. Refrigeration and Air Conditioning: An Introduction to HVAC by AHRI, Larry Jeffus, Prentice Hall, 2004	
Prerequisites	Obligatory	English, CEFR level B1 or higher
	Recommended	Completed courses on: Physics
Teacher	**Michał PAJĄK, Associate Professor**	
	Faculty of Mechanical Engineering	
	Location	ul. Stasieckiego 54, room 118
	E-mail	m.pajak@uthrad.pl
	phone	(+ 48) 48 361 71 49
Tuition fees	do not apply for EU/EEA citizens or exchange students	

CASIMIR PULASKI UNIVERSITY OF RADOM

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SYLLABUS

Title of course:	**Engineering application of the artificial intelligence techniques**	
Semester (year)	Autumn/Spring (2023/2024)	
Study level	Bachelor	
ECTS Credits	6	
Teaching methods:	Lectures / Seminars / Laboratories / Self-study	
Course topics	Fuzzy logic: fuzzy sets, fuzzy logic, fuzzy digits, fuzzy relations, fuzzy rules, fuzzy operations, fuzzy systems, fuzzy modelling, fuzzy controllers; Genetic Algorithms: genes, chromosomes, crossover, mutation, selection, genetic optimization, genetic engineering applications; multi-objective analysis and decision making; project of engineering genetic-fuzzy system	
Grading policy	Positive result of the examination and positive result of project	
References	1. Fuzzy Logic For Beginners by Masao Mukaidono, World Scientific, 2001 2. New Frontier in Evolutionary Algorithms: Theory and Applications 1st Edition by Hitoshi Iba, Nasimul Noman, Imperial College Press, 2011 3. Artificial Intelligence: The Basics 1st Edition by Kevin Warwick, Routledge, 2011	
Prerequisites	Obligatory	English, CEFR level B1 or higher
	Recommended	Completed courses on:mathematics
Teacher	**Michał PAJĄK, Associate Professor**	
	Faculty of Mechanical Engineering	
	Location	ul. Stasieckiego 54, room 118
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	phone	(+ 48) 48 361 71 49
Tuition fees	do not apply for EU/EEA citizens or exchange students	

CASIMIR PULASKI UNIVERSITY OF RADOM

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SYLLABUS

Title of course:	**English**	
Semester (year)	Autumn/Spring (2023/2024)	
Study level	Bachelor	
ECTS Credits	2	
Teaching methods:	Lectures / Self-study	
Course topics	Grammatical tenses (present simple, present continuous, static and dynamic verbs), present perfect, past simple gradation of adjectives, past tenses (past perfect, past perfect continuous), passive voice, 'gerund & infinitive' form reported speech. Thematic and lexical issues: describing family, people's character traits, personality, travel, means of transport, trips, money and ways of paying, education at various levels dream houses, office work, product advertising technology gadgets, technology addiction and protection against it. Definite and indefinite articles. Written form – informal letter, article Thematic and lexical issues, skills and capabilities; how to learn a language? Written forms: short story, film review.	
Grading policy	Positive result of the examination and positive result of project	
References	1. English File Intermediate, Student's book, Oxford University Press, 2018 2. English File Intermediate, Workbook, Oxford University Press, 2018 3. English File Inetrmediate, Teacher's book, Oxford University Press, 2018 4. Digi book (online version) 7. Virginia, Evans, FCE USE of English, Express Publishing, 1998 8. Jolanta Pasternak-Winiarska, Maria Teodorowicz, Technical English for Students of Mechanical Faculties, Oficyna Wydawnicza Politechniki Warszawskiej, 2008 9. Nick, Brieger, Alison, Pohl, Technical English – Vocabulary and Grammar, Summertown Publishing, 2002 10. Ivor, Williams, English for Science and Engineering, Thompson, 2007 11. Virginia Evans, Jenny Dooley, Carl Taylor, Career Paths, Electronics, Express Publishing 2012	
Prerequisites	Obligatory	English, CEFR level B1 or higher
	Recommended	Completed courses on: ---
Teacher	**Małgorzata Tatar**	
	Faculty of Mechanical Engineering	
	Location	ul. Stasieckiego 54, room 118
	E-mail	m.tatar@uthrad.pl
	phone	(+ 48) 48 361 71 59
Tuition fees	do not apply for EU/EEA citizens or exchange students	