

Course Title:	Additives for fuels and lubricants
Lecturer:	Prof. Ante Jukić, Ph.D.
Course Type:	Elective
ECTS:	6
Total Hours:	30 hours
Content of the Course:	The course offers understanding of how to improve the application properties of petroleum products, fuels and lubricants by adding special purpose substances – additives – in small dosages through theoretical knowledge and practical examples. It provides a discussion on the interaction between the chemical composition and the application properties of the product as well as on the mechanism of action of individual additives.
Competences:	The application and integration of fundamental and practical know-how of natural and technical sciences whilst identifying, describing and resolving complex engineering problems in the area of optimisation of action of additives in the fuel and lubricant industry.
Teaching Methodology:	Lectures, seminars, practical exercises
Course Units:	<p>The chemical composition of gasoline and diesel fuels, characterisation, relations between the composition and the main application properties.</p> <p>The chemical composition of mineral and synthetic base oils, characterisation, relations between the composition and the main application properties.</p> <p>Types of additives, chemical composition and their mechanism of action (from molecular interaction to their macro-properties): improvers of octane and cetane number, combustion promoters, detergents, dispersants, antioxidants, corrosion inhibitors, metal deactivators, viscosity improvers, pour point depressants, anti-wear additives, lubricant improvers, mixed and multifunctional additives.</p> <p>Methods of classification of additives and examples.</p> <p>The approaches to investigating additive effects, statistical planning of experiments.</p> <p>Examples of models for description of mixture behaviour.</p> <p>Examples of the development of additives: oxygenates, multifunctional additives.</p> <p>Applied nanotechnology.</p> <p>Other additives in the production and application of fuels and lubricants.</p>
Examination method:	Seminar, oral exam
References:	<ol style="list-style-type: none"> 1. I. N. Niranjan Kumar, S. Chandra Prasas, B. V. A. Rao, Diesel Fuel Performance and Additives, Society of Automotive Engineers, 2002. 2. S. P. Srivastava, Jenő Hancsók: Fuels and Fuel-Additives, ISBN: 978-0-470-90186-1, Wiley, 2014. 3. Fuel Additives, Hephæstus Books, 2011. 4. T. Mang, W. Dresel, Lubricants and Lubrication, John Wiley & Sons, 2007. 5. R. M. Mortier, S. T. Orszulik, Chemistry and Technology of Lubricants, 3rd ed., Springer, 2010.
Course in English:	Yes
Quality Monitoring Method:	Course quality and performance monitoring in accordance with the quality management system of the University of Zagreb. Self-evaluation of lecturers and student poll.