

Subject name	Liquid and Solid Biofuels	
Subject code	E.1.LSBX.SC.ECTIE.A	
Department	Institute of Machinery Management, Ergonomics and Production Processes	
Faculty	Faculty of Production and Power Engineering	
Subject supervisor/Lecturer	Prof. dr hab. Tadeusz Juliszewski	
General information	Teaching period	Winter semester
	ECTS credit	5
	Lectures total	15
	Laboratories	15
Objective and general description	Energy technology as a key element of agricultural engineering will be presented. Technology of biomass production and processing of biomass into liquid and solid biofuels will be described and analysed. Students gain a skill of technology (1) production and (2) processing of biomass with competence to analyse energy balance.	
Lectures, 15 hours	<ol style="list-style-type: none"> 1. Natural energy and biomass – 1 hour 2. Energy for biological systems and environment - 1 hour 3. Biomass liquid fuels: <ul style="list-style-type: none"> - ethanol – 2 hours - methanol – 1 hour - vegetable oils – 2 hours - oil esters – 2 hours 4. Biomass solid fuels: <ul style="list-style-type: none"> - fuel wood and charcoal – 1 hour - energy crops (short rotation woody crops SRWC herbaceous energy crops HEC) – 3 hours - production of briquettes and pellets – 2 hours 	
Lab practicals 15 hours	<ol style="list-style-type: none"> 1. Energy balance in biofuels production – 5 hours 2. Production costs of biofuels – 5 hours 3. Laboratory practicals: production of FAME, briquettes and pellets 	
References	<ol style="list-style-type: none"> 1. CIGR Handbook of agricultural engineering. Vol. V. Energy and biomass engineering. Published by American Society of Agriculture Engineers, 1999. 2. Doppenberg J., Aar P. Biofuels: implications for the feed industry. Wageningen Academic Publishers, 2007. 3. Oskam A. et All. EU Policy for agriculture, food and rural areas. Wageningen Academic Publishers, 2010. 4. Juliszewski T., Zając T. Biopaliwo rzepakowe, PWRiL, 2008. 5. Juliszewski T. Ogrzewanie biomasa. PWRiL, 2009. 	