Subject name	**Resistance Pant Breeding**	
Subject code	**E.1.RPBX.SC.ECTIE.R**	
Department	**Plant Breeding and Seed Science**	
Faculty	**Agriculture and Economics**	
Subject supervisor/Lecturer	**Dr. Tomasz Warzecha**	
General information	**semester**	**winter**
	ECTS credits	**3**
	Lectures total	**10 hrs**
	Laboratories/classes	**15 hrs**
Objective and general description	The course aims focus on introduction the basic knowledge about impact of diseases to global food production, plant-pathogen system interaction, various assessment methods of susceptibility to plant diseases cause by selected biotic factors (fungi, viruses, bacteria) and the possibilities of controlling plant diseases with alternative methods to chemical protection based on resistant or less susceptible varieties, created with conventional breeding method application, as well as generated through genetic engineering. **Lectures** 1. Biotic stress caused by viruses, bacteria and fungi. Abiotic stress: cold, frost, drought, pollution. Plant pathogens and their impact on global food production 2. Plant disease symptoms, etiology of plant diseases 3. Changes in plants caused by infection and disease progression. Physiological changes accompanying disease development (respiration, photosynthesis). Structural and anatomical changes 4. Terms and plant defense mechanisms a) resistance- susceptibility , scale b) types of plant defense mechanisms a) types of plant response to infection Molecular basis of resistance to infection. 5. Genetic basis of resistance breeding, host – pathogen interaction 6. Classical breeding methods in creation of resistant varieties a) selection of homozygous lines b) pedigree breeding c) backcross method Biotechnological methods in resistance plant breeding **Lab classes** 1. Facultative pathogen propagation, inoculum production for lab, greenhouse and field tests purposes – media, conditions, preservation -2 h. 2. Evaluation of resistance in cereals to facultative pathogens e.g. Fusarium a) laboratory test b) greenhouse test c) field test Impact of Fusarium on food production (quantitative and qualitative loses) 3. Calculation of disease severity and plant resistance based on lab,	

	greenhouse and field tests. Estimation of seedling blight severity (5 degree scale, weight reduction), determining of phenolic acid concentration. Reduction of yield components in cereals. Species, varieties and lines variability of disease severity among selected cereals 4. Marker assisted selection (MAS) in plant breeding (utilizing PCR-based markers in triticale and wheat selection) 5. Molecular diagnostics – detection of Fusarium infection and food contamination based on PCR method (species specific primers and trichotecene genes specific primers)
Assessment method	An examination of different germplasm (DH lines, varieties) to biotic stress, working individually and in teams of two people • Reports from lab and greenhouse resistance tests • An essay focused on disease in selected crop • Activity in the class discussion Final: written test exam (about 20 questions from the entire range of the subject with four response options
References	1. Arseniuk E., Góral T., Czembor H.J. 1993. Reaction of triticale, wheat, and rye accessions to graminaceous Fusarium spp. infection at the seedling and adult plant growth stages. Euphytica 70: 175-183. 2. Dhan Pal Singh, 1986: Breeding for resistance to disease and insect pest. Springer - Verlag 3. Jacobs Th., Parlevist J.E., 1993: Durability of disease resistance, Kluwer Academic Publishers 4. Chełkowski J. , Golka L. , Jakubowski P., 2002. Putative resistance genes of cereals: structure and expected function, J. Appl. Genet. 43(3), pp. 297-308 5. Vanderplank J.E., 1984:Disease resistance in plants, Academic Press, INC. 6. Vidhyasekaran P., 2002: Bacterial disease resistance in plants, Food Products Press ® 7. Warzecha T., Zieliński A., Skrzypek E., Wójtowicz T., Moś M., 2012. Effect of mechanical damage on vigor, physiological parameters, and susceptibility of oat (Avena sativa) to Fusarium culmorum infection. Phytoparasitica 40: 29-36. DOI 10.1007/s12600-011-0196-y