## Studia stacjonarne drugiego stopnia na kierunku Transport – profil ogólnoakademicki Card of Course **Measurement Systems in Transportation Practice**

Code of course       IM0:TR000-MSA-0105         Name of course       2021/2         Version of course       3021/2         A.Place of the course in system of studies       5etual-cycle degree         Form and mode of studies       Full-time studies         Form and mode of studies       General academic profile         Specialization       Main field         Place of teaching of course       Warswo University of Technology, Faculty of Transport, Division of of Information Technology and Mechatronics in Transport, Division of of Information Technology and Mechatronics in Transport, Warswo University of Technology, Taustyor, Warswo University of Technology, Taustyor, Warswo University of Technology, Taustyor, Warswo University of Technology and Mechatronics in Transport, Warswo University of Technology, Taustyor, Warswo University of Technology, Taustyor, Warswo University of Technology and Mechatronics in Transport, Warswo University of Technology and Mechatronics in Transport, Faculty of Transport, Warswo University of Technology         B.General Characteristic of the course       Maintory         Level of course       Maintory         Level of course       Maintory         Level of course in the auster       I semster         studentic yer       I         Strand y Due       I semster         Location of the course in the austyre in the austrement systems used in transport system.       Ferefrect of the austrement system susted in transport system.         C.Effec	Description	on of course						
Name of courseVersion of courseVer	Code of cou	ırse	1160-TR000-MSA-0105					
Version of course     202122       A. Place of the course in systudies     studies       Evel of education     Second-cycle degree       Form and mode of studies     Transport       Profile of studies     General academic profile       Specialization     Main field       Place of teaching of course     Warsaw University of Technology, Faculty of Transport, Division of Information Technology and Mechatronics in Transport       Place of teaching of course     Not applicable       Coordinator of course     Not applicable       Coordinator of course     Not applicable       Coordinator of course     Machatronics in Transport, Faculty of Transport, Marsaw University of Technology and Mechatronics in Transport, Marsaw University of Technology and Mechatronics in Transport, Security of Transport, Marsaw University of Technology and Mechatronics in Transport, Security of Transport, Marsaw University of Technology and Mechatronics in Transport, Security of Transport, Marsaw University of Technology and Mechatronics in Transport, Security of Transport, Marsaw University of Technology and Mechatronics in Transport, Security of Transport, Division of on Information Technology, Security of Transport, Division of on Information Technology, Security of Transport, Division of on Information Security of Transport, Division of Course       B. General characteristic of the course     Mardatory       Level of course in the course     Mardatory       Level of course in the course in the mode course in the security of Transport, Division of the field of studer       Second the course in the append	Name of co	urse	Measurement Systems in Transportation I	Practice				
A. Place of the course in system of studies       Second-cycle degree         Level of education       Second-cycle degree       Second-cycle degree         Field of studies       Full-time studies       Second-cycle degree         Profile of studies       General academic profile       Second-cycle degree         Specialization of course       Main fiel       Main fiel         Place of realization of course       Not applicable       Second-cycle degree         Coordinator of course       Not applicable       Second-cycle degree         Coordinator of course       Specialization course       Specialization course         B. General characteristic of ITe course       Specialization course       Specialization course         Coroup/Block of course       Mandatory       Second-cycle degree       Specialization course         Level of course       Intermediate       Specialization course       Specialization course         Location of the course in the       I semester       Sudgraph – nominal semester       Sudgraph – nominal semester         Location of the course in the       I semester       Specialization of the course in the academic years in students sudents with the theory of sudgraph – nominal semester         Location of the course in the       I semester       Specialization course is to acquaint students with the theory of sudgraph – nominal semester       Specializ	Version of course		2021/22					
Level of education       Second-cycle degree         Form and mode of studies       Fall-time studies         Form and mode of studies       Transport         Profile of studies       General academic profile         Specialization       Main field         Profile of cause       Warsaw University of Technology, Faculty of Transport, Division of of Information Technology and Mechatronics in Transport         Place of reaching of course       Not applicable         Coordinator of course       PhD Eng. Grzegorz Dobrzynski, Division of of Information Technology and Mechatronics in Transport, Faculty of Transport, Marsaw University of Technology         B. General characteristic of the course       Intermediate         Type of course       Madatory         Level of course       Madatory         Language of course       English         Location of the course in the course is to acquaint students with the theory and practice of building measurement systems used in transport systems.         Effects of education and maneer of teaching muctomes for the area and field of study         No. effect       Intering outcomes is to acquaint students with the theory an	A. Place	of the course in system	n of studies					
Form and mode of studies       Field of studies       Transport         Field of studies       General academic profile       Secialization       Main field         Place of teaching of course       Warsaw University of Technology, Faculty of Transport, Division of of Information Technology and Mechatronics in Transport       Field of studies         Place of realization of course       Not applicable       Transport       Versaw University of Technology, Faculty of Transport, Division of of Information Technology and Mechatronics in Transport, Faculty of Transport, Warsaw University of Technology         R. General characteristic of the course       Madatory       Versaw University of Technology         Level of course       Intermediate       Versaw University of Technology         Profile of studies       Specialization courses       Versaw University of Technology         Level of course       Intermediate       Versaw University of Technology         Specialization       Madatory       Versaw University of Technology         Language of course       Intermediate       Versaw University of Technology         Profile of studies       I semester       Versaw University of Technology         Profile of studients       I semester       Versaw University of Technology         Profile of studients       I semester       Versaw University of Technology         Profiling students       I semester	Level of ed	lucation	Second-cycle degree					
Field of studies       Transport         Profile of studies       General academic profile         Specialization       Main field         Place of teak-hing of course       Warsaw University of Technology, Faculty of Transport, Division of of Information Technology and Mechatronics in Transport         Place of realization of course       Nor applicable         Coordinator of course       PhID Eng. Grzegorz Dobrzynski, Division of Information Technology and Mechatronics in Transport, Faculty of Information Technology Transport         Type of course       Information         Specialization courses       Information         Type of course in the study of course in the study of studietts       I semester         Location of the course in the study of studietts       I semester         Cordino of the course in the fact of the facof study Purpose of course       I r	Form and	mode of studies	Full-time studies					
Profile of studies       General academic profile         Specialization       Main field         Place of realization of course       Warsaw University of Technology, Faculty of Transport, Division of Information Technology and Mechatronics in Transport, Faculty of Information Technology and Mechatronics in Transport, Faculty of Information Technology and Mechatronics in Transport, Faculty of Transport, Warsaw University of Technology         Place of realization of course       Not applicable         Coordinator of course       Specialization courses         Seclear characteristic of the course in the diadory       Mandatory         Language of course       Mandatory         Location of the course in the study plan – nominal senseter       Intermediate         Specialization course       Intermediate         Location of the course in the study plan – nominal senseter       I senseter         Course       I senseter         Course       I senseter         Course       I senseter         Course       The aim of the course is to acquaint students with the theory and practice of building measurement systems used in transport systems.         Formal       Specialization of the ecurse is to acquaint students with the theory and practice of building measurement systems used in transport systems.         Fiftets of ducation and macro of the effect       Keference to the charge strans guardia systems used in transport systems.         Fi	Field of st	udies	Transport					
Specialization       Main field         Place of real:ching of course       Warsaw University of Technology: and Mechatronics in Transport       Fransport         Place of realization of course       Not applicable       Fransport       Fransport         Coordinator of course       PhD Eng. Grzegorz. Dobrzynski, Division of of Information Technology and Mechatronics in Transport, Facality of Transport, Warsaw University of Technology         B. General - characteristic of the course       Specialization courses       Evel of course       Mechatronics in Transport, Facality of Transport, Warsaw University of Technology and Mechatronics in Transport, Facality of Transport, Warsaw University of Technology         B. General - characteristic of the course       Immediate       Evel of course       Mandatory         Language of course       Mandatory       English       Evel of course       English         Lacation of the course in the stady plan - nominal semester       I semester       Evel of course       I semester         Coordinativer       I semester       I semester       Evel of course       I practice of plaiding measurement systems used in transport systems.         Creation of the course in the seconder in the erraning outcomes for the area and Field of study       I practice of plaiding measurement systems used in transport systems.       Reference to the laring outcomes for the area and Field of study         Preliminativer       I and of the effect       I be area fie	Profile of	studies	General academic profile					
Place of teaching of course Technology and Mechatronics in Transport. Division of of Information Technology and Mechatronics in Transport.       Transport. Division of of Information Transport.         Place of realization of course       Not applicable       Transport. Division of of Information Technology and Mechatronics in Transport. Faculty of Transport. Warsaw University of Technology         B. General characteristic of the course       Specialization courses       Specialization courses         Level of course       Intermediate       Totapple         Type of course       Mandatory       Intermediate         Location of the course in the academic year       I semester       Isemester         Preliminary requirements - format       I semester       Isemester         Preliminary requirements - format       Isemester       Isemester         Preliminary requirements - format       Isemester       Isemester         Purpose for use       The aim of the course is to acquaint students with the theory and reactice of building measurement system sused in transport systems.         Effects of education and marner of teaching englet       Preciption of the effect       Reference to the learning outcomes in the program         No. effect       Description of the effect       Preciption of signals and their basic characteristics in the time and frequency domains.       IrSA_W07         W1       Has knowledge of the theory of signals and their basic characteristics in	Specializa	tion	Main field					
Place of realization of course       Not applicable         Coordinator of course       PhD Eng. Grzegorz Dobrzynski, Division of of Information Technology and Mechatronics in Transport, Faculty of Transport, Warsaw University of Technology         B. General characteristic of the course       Specialization courses         Evel of course       Intermediate         Type of course       Mandatory         Language of course       Mandatory         Location of the course in the study plan – nominal semester       I semester         Location of the course in the study plan – nominal semester       I semester         Preliminary requirements - formal       I semester         Limit of students       -         Very pose of course       The aim of the course is to acquaint students with the theory and practice of building measurement systems used in transport systems.         Effects of education with reference to the learning outcomes for the area and field of study study.         No.       Perspective of digital-to-analog processing.         No1       Has knowledge of the theory of signals and their basic       IP78_WG.o       Tr2A_W07         Has knowledge of digital-to-analog processing.       IP78_WG.o       Tr2A_W07         Has knowledge of digital-to-analog processing.       IP78_WG.o       Tr2A_W07         Has knowledge of the theory of signals and their basic       IP78_WG.o       Tr2A	Place of teaching of course		Warsaw University of Technology, Faculty of Transport, Division of of Information Technology and Mechatronics in Transport					
Coordinator of course MPhD Eng. Grzegorz Dobrzynski, Division of of Information Technology and Mechatronics in Transport, Faculty of Transport, Warsaw University of Technology B. General characteristic of the course Group/Block of course Specialization courses Level of course Intermediate Type of course Mandatory Language of course English Location of the course in the I Limit of students C. Effects of education and manner of teaching Purpose of course The aim of the course is to acquaint students with the theory and practice of building measurement systems used in transport systems. Effects of education with reference to the learning outcomes for the area and field of study MNA effects of the theory of signals and their basic IPS_WG.0 TY2A_W07 Has knowledge of the selection of sensors and measuring Has knowledge of th	Place of re	ealization of course	Not applicable					
B. General characteristic of the course Group/Block of courses Specialization courses Level of course Mandatory Language of course English Location of the course in the I study plan – nominal semester Location of the course in the I secademic year Preliminary requirements - formal I C. Effects of education and manner of leaching Purpose of course The aim of the course is to acquaint students with the theory and practice of building measurement systems used in transport systems. Effects of education with reference to the learning outcomes in there and field of study effect V No. effect V No. effe	Coordinator of course		PhD Eng. Grzegorz Dobrzynski, Division of of Information Technology and Mechatronics in Transport, Faculty of Transport, Warsaw University of Technology					
Group/Block of coursesSpecialization coursesLevel of courseIntermediateType of courseMandatoryLanguage of courseEnglishLocation of the course in the study plan – nominal semesterILocation of the course in the academic yearI semesterPreliminary requirements - formalIPreliminary requirements - formad-Keffects of education and manner of teaching-Purpose of courseThe aim of the course is to acquaint students with the theory and practice of building measurement systems used in transport systems.Effects of education with reference to the learning outcomes for the area entry of signals and their basic characteristics in the time and frequency domains.Reference to the learning outcomesW01Has knowledge of the theory of signals and their basic characteristics in the time and frequency domains.I.P75_WG.oTr2A_W07W03Has knowledge of the selection of sensors and measuring transducers, the correct conditions of their work and calibration.I.P75_WG.oTr2A_W11W03Is able to synthesize the measurement path with the use of computer techniques.I.P75_UW.o. II.P75_UW.o.Tr2A_U06U04Can easuma shape.I.P75_UW.o. III.P75_UW.o.Tr2A_U06U04Can cooperate with other people during team work and take a lead at eaam.I.P75_UW.o.Tr2A_U06U04Can cooperate with other people during team work and take a lead at eaam.I.P75_WK.oTr2A_U06U04Can think and act in a creative and enterprising way.I.P75_KO	B. Gener	al characteristic of th	e course					
Level of course       Intermediate         Type of course       Madatory         Language of course in the study plan – nominal senseter       I         Location of the course in the study plan – nominal senseter       I senseter         Location of the course in the academic year       I senseter         Preliminary requirements - formal       I senseter         Limit of students       -         C. Effects of education and mammer of teaching       The aim of the course is to acquaint students with the theory and practice of building measurement systems used in transport systems.         Effects of education with reference to the learning outcomes for the area and field of study         No. effect       Description of the effect       Reference to the characteristics of learning outcomes       Reference to the learning outcomes in the program         W01       Has knowledge of the theory of signals and their basic characteristics in the time and frequency domains.       LP7S_WG.o       Tr2A_W07         W03       Has knowledge of the selection of sensors and measuring transducers, the correct conditions of their work and calibration.       LP7S_WG.o       Tr2A_W07         W04       Is able to synthesize the measurement path with the use of computer techniques.       LP7S_WG.o       Tr2A_W01         W03       Is able to synthesize the measurement path with the use of computer techniques.       LP7S_WU.o.       Tr2A_U06	Group/Blo	ck of courses	Specialization courses					
Type of courseMandatoryLanguage of courseEnglishLocation of the course in the academic yearIInternational senseterILocation of the course in the academic yearIPreliminary requirements - formal-C. Effects of education and manner of teaching-Purpose of courseThe aim of the course is to acquaint students with the theory are previous output to the tearning outcomes in terms of studyPurpose of courseThe aim of the course is to acquaint students with the theory are previous output to the tearning outcomes in terms of studyNo. effects of education with reference to the learning outcomes in terms of for the area and field of studyReference to the learning outcomes in terms of transportNo. effects of education with reference to the learning outcomes in terms of transport systems.Reference to the learning outcomes in terms of transportW01 W01 Has knowledge of the theory of signals and their basic characteristics in the time and frequency domains.LP7S_WG.0Tr2A_W07 Tr2A_W07 LP7S_WKW02 Has detailed knowledge of digital-to-analog processing. computer terbing outcomes on terms of skillsLP7S_WG.0Tr2A_W07 LP7S_WKW03 Con estimate selected characteristics and interpret the results. computer terbing outcomes in terms of skillsLP7S_UW.0. ILP7S_UW.0.Tr2A_W07 LP7S_UW.0U01 Con estimate selected characteristics and interpret the results. computer terbing outcomes in terms of skillsLP7S_UW.0. ILP7S_UW.0.Tr2A_U06 ILP7S_UW.0U01 Con estimate selected characteristics and interpret the results. <td>Level of co</td> <td>ourse</td> <td colspan="5">Intermediate</td>	Level of co	ourse	Intermediate					
Language of course in the location of the course in the study plan – nominal sensetILocation of the course in the academic year1 semesterLocation of the course in the academic year1 semesterPreliminary requirements - formal-Preliminary requirements - formal-Vert of students-CE.Effects of education and marrer of teaching measurement systems used in transport systems.practice of building measurement systems used in transport systems.Effects of education with reference to the learning outcomes for the area and field of study measurement systems used in transport systems.Reference to the characteristics of learning outcomes in terms of Kerence to the characteristics of learning outcomes in terms of the characteristics of in the programReference to the characteristics of in the programW01Has knowledge of the twory of signals and their basic characteristics in the time and frequency domains.IP7S_WG.0Tr2A_W07W02Has knowledge of the twory of signals and their basic transducers, the correct conditions of their work and calibration. IP7S_WKTr2A_W11W03Has knowledge of the twory of sensors and measuring transducers, the correct conditions of their work and calibration. ILP7S_WK.0Tr2A_W07U04Sabet to synthesize the measurement path with the use of transducers, the correct conditions of their work and calibration. ILP7S_UW.0Tr2A_U06W03Can estimate selected characteristics and interpret the results. transducers, the correct conditions of their work and calibration. ILP7S_UW.0Tr2A_U06W04Can estimat	Type of co	urse	Mandatory					
Location of the course in the atom nominal sensetar       I         Location of the course in the academic year       I sensetser         Academic year       I sensetser         Preliminary requirements - formal       -         Limit of students       -         C. Effects of education and mammer of teaching       -         Purpose of ourse       The aim of the course is to acquaint students with the theory and practice of building measurement systems used in transport systems.         Effects of education with reference to the learning outcomes for the area and field of study measurement systems used in transport systems.       Reference to the learning outcomes in terms of knaracteristics on in the program         No. effect       -       Not the showledge of the theory of signals and their basic       LPTS_WG.o       Tr2A_W07         W01       Has knowledge of the theory of signals and their basic       LPTS_WG.o       Tr2A_W07         W02       Has detailed knowledge of digital-to-analog processing.       LPTS_WG.o       Tr2A_W07         W03       Is able to synthesize the measurement path with the use of transport systems.       LPTS_WG.o       Tr2A_W07         W04       Is able to synthesize the measurement path with the use of transducers, the correct conditions of their work and calibration.       LPTS_WG.o       Tr2A_W07         W05       Is able to synthesize the measurement path with the use of tr2A_W07 <td< td=""><td>Language</td><td>of course</td><td colspan="5">English</td></td<>	Language	of course	English					
study plan = nominal semesterLocation of the course in the academic yearI semesterPreliminary requirements - formal-C.Effects of education and mamer of teaching-Purpose of courseThe aim of the course is to acquaint students with the theory and practice of building measurement systems used in transport systems.Effects of education with reference to the learning outcomes for the area and field of studyNo. effectDescription of the effectReference to the characteristics of learning outcomes in terms of has detailed knowledge of the theory of signals and their basic characteristics in the time and frequency domains.Ir2A_W07W01Has knowledge of the selection of sensors and measuring transducers, the correct conditions of their work and calibration.IP7S_WG.oTr2A_W07W03Has knowledge of the selection of sensors and measuring transducers, the correct conditions of their work and calibration.IP7S_WG.oTr2A_W07U01Is able to synthesize the measurement path with the use of computer techniques.IP7S_WG.oTr2A_W07U02Can estimate selected characteristics and interpret the results.IP7S_UW.o. III.P7S_UW.o.Tr2A_U06U03Can cooperate with other people during team work and take a lead a team.IP7S_UW.o. III.P7S_UW.o.Tr2A_U20U04Can cooperate with other people during team work and take a lead a team.IP7S_UW.o. III.P7S_UW.o.Tr2A_U20U03Can measure shape.LP7S_UW.o. III.P7S_UW.o.Tr2A_U20U04Can cooperate with other people during team work and take	Location of	of the course in the	1					
Location of the course in the academic year       I semester         Preliminary requirements - formal       -         Limit of students       -         C. Effects of education and mamer of teaching       -         Purpose of course       The aim of the course is to acquaint students with the theory and practice of building measurement systems used in transport systems.         Effects of education with reference to the learning outcomes for the area and field of study         No. effect       Purpose of course         No. effect       Description of the effect         Not has knowledge of the theory of signals and their basic characteristics of learning outcomes in terms of knowledge       IP7S_WG.0         W01       Has detailed knowledge of digital-to-analog processing.       I.P7S_WG.0       Tr2A_W07         W03       Has knowledge of the selection of sensors and measuring transducers, the correct conditions of their work and calibration.       I.P7S_WG.0       Tr2A_W07         W11       It able to synthesize the measurement path with the use of computer techniques.       I.P7S_WU.0       Tr2A_W07         W12       Has clousynthesize the measurement path with the use of computer techniques.       I.P7S_WU.0       Tr2A_W07         W12       Has detailed knowledge of the selection of sensors and measuring outcomes in terms of skills       IV2A_W07         W12       It as able to synthesize the measurement path with th	study plan	– nominal semester						
Preliminary requirements - formal         -           Imit of students         -           C. Effects of education and manner of teaching         -           Purpose of course         The aim of the course is to acquaint students with the theory and practice of building measurement systems used in transport systems.           Effects of education with reference to the learning outcomes for the area and field of study           No. effect         Operation of the effect         Reference to the characteristics of learning outcomes in terms of kearacteristics of learning outcomes in terms of the organism.         Reference to the learning outcomes in terms of the organism of the program outcomes in terms of the area and field of study           W01         Has knowledge of the theory of signals and their basic characteristics of digital-to-analog processing.         I.PTS_WG.o         Tr2A_W07           W02         Has knowledge of the selection of sensors and measuring outcomes in terms of JSWK         Tr2A_W07           W03         Has knowledge of the selection of sensors and measuring outcomes in terms of JSWK         Tr2A_W07           U04         Is able to synthesize the measurement path with the use of computer techniques.         I.PTS_UW.o.         Tr2A_W07           U05         Is able to synthesize the measurement path with the use of computer techniques.         I.PTS_UW.o.         Tr2A_U06           U06         Can estimate selected the repole during team work and take a learnis outcome in terms of SUUNO.	Location of the course in the academic year		1 semester					
Limit of students         -           C. Effects         of education and manuer of teaching           Purpose         of course         The aim of the course is to acquaint students with the theory and practice of building measurement systems used in transport systems.           Effects         of education with reference to the learning outcomes for the area and field of study           No. effect         Description of the effect         Reference to the characteristics of learning outcomes in terms of knowledge         Reference to the learning outcomes in terms of knowledge           W01         Has knowledge of the theory of signals and their basic characteristics in the time and frequency domains.         I.P7S_WG.0         Tr2A_W07           W02         Has knowledge of the theory of signals and their basic characteristics on the time and frequency domains.         I.P7S_WG.0         Tr2A_W07           W03         Has knowledge of the theory of sensors and measuring transducers, the correct conditions of their work and calibration.         I.P7S_WK.0         Tr2A_W11           W04         Is able to synthesize the measurement path with the use of computer techniques.         I.P7S_WW.0         Tr2A_U06           U01         Is able to synthesize the measurement path with the use of computer techniques.         I.P7S_UW.0         Tr2A_U06           U02         Can estimate selected characteristics and interpret the results.         I.P7S_UW.0         Tr2A_U06           U0	Preliminary requirements - formal		-					
C. Effects of education and manner of teaching         The aim of the course is to acquaint students with the theory and practice of building measurement systems used in transport systems.         Effects of education with reference to the learning outcomes for the area and field of study         Reference to the learning outcomes for the area and field of study         No.       Reference to the characteristics of learning outcomes in terms of transport systems.       Reference to the learning outcomes in terms of tearning outcomes in the program         W0.       Has knowledge of the theory of signals and their basic characteristics in the time and frequency domains.       I.P7S_WG.00       Tr2A_W07         W0.0       Has knowledge of the selection of sensors and measuring transducers, the correct conditions of their work and calibration.       I.P7S_WG.00       Tr2A_W07         W01       Is able to synthesize the measurement path with the use of computer techniques.       I.P7S_WG.00       Tr2A_W07         U01       Is able to synthesize the measurement path with the use of computer techniques.       I.P7S_UW.0.       Tr2A_U06         U02       Can estimate selected characteristics and interpret the results.       I.P7S_UW.0.       Tr2A_U06         U01       Is able to synthesize the measurement path with the use of computer techniques.       I.P7S_UW.0.       Tr2A_U06         U02       Can estimate selected characteristics and interpret the	Limit of st	udents	-					
Purpose of courseThe aim of the course is to acquaint students with the theory and practice of building measurement systems used in transport systems.Effects of education with reference to the learning outcomes for the area and field of studyNo. effectDescription of the effectReference to the learning outcomes in terms of learning outcomesReference to the learning outcomes in the programW01 W01Has knowledge of the theory of signals and their basic characteristics in the time and frequency domains.I.P7S_WG.0Tr2A_W07W02 W03Has knowledge of the selection of sensors and measuring transducers, the correct conditions of their work and calibration.I.P7S_WG.0Tr2A_W07Tr2A_W11W03 W04Has knowledge of the selection of sensors and measuring transducers, the correct conditions of their work and calibration.I.P7S_WG.0Tr2A_W07Tr2A_W11W04 W03Is able to synthesize the measurement path with the use of computer techniques.I.P7S_UW.0Tr2A_U06U04 U02Is able to synthesize the measurement path with the use of earling outcomesI.P7S_UW.0. III.P7S_UW.0Tr2A_U06U03 U03Can measure shape.I.P7S_UW.0. III.P7S_UW.0Tr2A_U06U04 U04Can cooperate with other people during team work and take a lead a team.I.P7S_UW.0Tr2A_U20Sumed learning outcomes in the field of social teamsSumed learning outcomes in the field of social teamsColspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspa	C. Effect	s of education and mo	nner of teaching					
Effects of education with reference to the learning outcomes for the area and field of studyNo. effectDescription of the effectReference to the characteristics of learning outcomesReference to the eharacteristics of learning outcomesW01Has knowledge of the theory of signals and their basic characteristics in the time and frequency domains.I.P7S_WG.0Tr2A_W07W02Has detailed knowledge of digital-to-analog processing. transducers, the correct conditions of their work and calibration.I.P7S_WG.0Tr2A_W07W03Has knowledge of the selection of sensors and measuring transducers, the correct conditions of their work and calibration.I.P7S_WG.0Tr2A_W07W04Is able to synthesize the measurement path with the use of computer techniques.I.P7S_UW.0.Tr2A_U06U02Can estimate selected characteristics and interpret the results.I.P7S_UW.0.Tr2A_U06U03Can cooperate with other people during team work and take a lead a team.I.P7S_UW.0.Tr2A_U06U04Can think and act in a creative and enterprising way.I.P7S_KOTr2A_U20	Purpose of course		The aim of the course is to acquaint students with the theory and practice of building measurement systems used in transport systems.					
No. effectDescription of the effectReference to the characteristics of learning outcomesReference to the learning outcomesW01Has knowledge of the theory of signals and their basic characteristics in the time and frequency domains.I.P7S_WG.oTr2A_W07W02Has detailed knowledge of digital-to-analog processing. transducers, the correct conditions of their work and calibration. transducers, the correct conditions of their work and calibration.I.P7S_WG.oTr2A_W07W03Has knowledge of the selection of sensors and measuring transducers, the correct conditions of their work and calibration. computer techniques.I.P7S_UW.o. II.P7S_UW.o. III.P7S_UW.o. III.P7S_UW.o. III.P7S_UW.o. III.P7S_UW.o.Tr2A_U06U04Can estimate selected characteristics and interpret the results. lead a team.I.P7S_UW.o. III.P7S_UW.o. III.P7S_UW.o.Tr2A_U06U04Can cooperate with other people during team work and take a lead a team.I.P7S_UW.oTr2A_U20KS01Can think and act in a creative and enterprising way.I.P7S_KOTr2A_K04	Effects of	education with reference	ce to the learning outcomes for the area a	nd field of study				
Assumed learning outcomes in terms of knowledgeW01Has knowledge of the theory of signals and their basic characteristics in the time and frequency domains.I.P7S_WG.o I.P7S_WG.oTr2A_W07 Tr2A_W07 Tr2A_W11W02Has detailed knowledge of digital-to-analog processing. transducers, the correct conditions of their work and calibration.I.P7S_WG.o I.P7S_WKTr2A_W07 Tr2A_W11W03Has knowledge of the selection of sensors and measuring transducers, the correct conditions of their work and calibration.I.P7S_WG.o I.P7S_WKTr2A_W07 Tr2A_W11U01Is able to synthesize the measurement path with the use of computer techniques.I.P7S_UW.o. III.P7S_UW.o III.P7S_UW.oTr2A_U06 Tr2A_U06U02Can estimate selected characteristics and interpret the results. lead a team.I.P7S_UW.o. III.P7S_UW.oTr2A_U06 Tr2A_U06U04Can cooperate with other people during team work and take a lead a team.I.P7S_KOTr2A_U20KS01Can think and act in a creative and enterprising way.I.P7S_KOTr2A_K04	No. effect	De	scription of the effect	Reference to the characteristics of learning outcomes	Reference to the learning outcomes in the program			
W01Has knowledge of the theory of signals and their basic characteristics in the time and frequency domains.I.P7S_WG.oTr2A_W07W02Has detailed knowledge of digital-to-analog processing. transducers, the correct conditions of their work and calibration.I.P7S_WG.o I.P7S_WG.o I.P7S_WG.oTr2A_W07 Tr2A_W11W03Has knowledge of the selection of sensors and measuring transducers, the correct conditions of their work and calibration.I.P7S_WG.o I.P7S_WG.oTr2A_W07 Tr2A_W11U01Is able to synthesize the measurement path with the use of computer techniques.I.P7S_UW.o. III.P7S_UW.oTr2A_U06U02Can estimate selected characteristics and interpret the results. Pres_UW.oI.P7S_UW.o. III.P7S_UW.oTr2A_U06U03Can measure shape.I.P7S_UW.o. III.P7S_UW.oTr2A_U06U04Can cooperate with other people during team work and take a lead a team.I.P7S_UOTr2A_U20KS01Can think and act in a creative and enterprising way.I.P7S_KOTr2A_K04	Assumed learning outcomes in terms of knowledge							
W02Has detailed knowledge of digital-to-analog processing.I.P7S_WG.oTr2A_W07I.P7S_WKTr2A_W11W03Has knowledge of the selection of sensors and measuring transducers, the correct conditions of their work and calibration.I.P7S_WG.oTr2A_W07I.P7S_WKTr2A_W11I.P7S_WKTr2A_W11Assumed learning outcomes in terms of skillsU01Is able to synthesize the measurement path with the use of computer techniques.I.P7S_UW.o.Tr2A_U06U02Can estimate selected characteristics and interpret the results.I.P7S_UW.o.Tr2A_U06U03Can measure shape.I.P7S_UW.o.Tr2A_U06U04Can cooperate with other people during team work and take a lead a team.I.P7S_UOTr2A_U20KS01Can think and act in a creative and enterprising way.I.P7S_KOTr2A_K04	W01	Has knowledge of the t characteristics in the tin	theory of signals and their basic me and frequency domains.	I.P7S_WG.o	Tr2A_W07			
W03Has knowledge of the selection of sensors and measuring transducers, the correct conditions of their work and calibration.I.P7S_WKTr2A_W07VSSumed learning outcomes in terms of skillsU01Is able to synthesize the measurement path with the use of computer techniques.I.P7S_UW.o. III.P7S_UW.oTr2A_U06U02Can estimate selected characteristics and interpret the results.I.P7S_UW.o. III.P7S_UW.oTr2A_U06U03Can measure shape.I.P7S_UW.o. III.P7S_UW.oTr2A_U06U04Can cooperate with other people during team work and take a lead a team.I.P7S_UOTr2A_U20KS01Can think and act in a creative and enterprising way.I.P7S_KOTr2A_K04	W02	Has detailed knowledg	e of digital-to-analog processing.	I.P7S_WG.0	Tr2A_W07			
W03Has knowledge of the selection of sensors and measuring transducers, the correct conditions of their work and calibration.I. P7S_WKTr2A_W11Assumed learning outcomes in terms of skillsU01Is able to synthesize the measurement path with the use of computer techniques.I.P7S_UW.o. III.P7S_UW.oTr2A_U06U02Can estimate selected characteristics and interpret the results.I.P7S_UW.o. III.P7S_UW.oTr2A_U06U03Can measure shape.I.P7S_UW.o. III.P7S_UW.oTr2A_U06U04Can cooperate with other people during team work and take a lead a team.I.P7S_UOTr2A_U20KS01Can think and act in a creative and enterprising way.I.P7S_KOTr2A_K04	W03	Has knowledge of the	selection of sensors and measuring	I.P/S_WK	$\frac{112A_W11}{Tr2A_W07}$			
Assumed learning outcomes in terms of skillsU01Is able to synthesize the measurement path with the use of computer techniques.I.P7S_UW.o. III.P7S_UW.oTr2A_U06U02Can estimate selected characteristics and interpret the results.I.P7S_UW.o. III.P7S_UW.oTr2A_U06U03Can measure shape.I.P7S_UW.o. III.P7S_UW.oTr2A_U06U04Can cooperate with other people during team work and take a lead a team.I.P7S_UOTr2A_U20KS01Can think and act in a creative and enterprising way.I.P7S_KOTr2A_K04	transducers the correct		t conditions of their work and calibration.	LP7S_WK	Tr2A W11			
U01Is able to synthesize the measurement path with the use of computer techniques.I.P7S_UW.o. III.P7S_UW.oTr2A_U06U02Can estimate selected characteristics and interpret the results.I.P7S_UW.o. III.P7S_UW.oTr2A_U06U03Can measure shape.I.P7S_UW.o. III.P7S_UW.oTr2A_U06U04Can cooperate with other people during team work and take a lead a team.I.P7S_UOTr2A_U20Tr2A_U06Tr2A_U06Tr2A_U06Tr2A_U06U03Can measure shape.I.P7S_UW.o. II.P7S_UW.oTr2A_U06Tr2A_U06Tr2A_U06Tr2A_U06Tr2A_U06Tr2A_U06Tr2A_U06II.P7S_UW.o. II.P7S_UW.oTr2A_U06Tr2A_U06Tr2A_U06Tr2A_U06Tr2A_U06Tr2A_U06Tr2A_U06Tr2A_U20Tr2A_U20KS01Can think and act in a creative and enterprising way.I.P7S_KOTr2A_K04	Assumed learning outcomes in terms of skills							
computer techniques.III.P7S_UW.oU02Can estimate selected characteristics and interpret the results.I.P7S_UW.o. III.P7S_UW.oTr2A_U06U03Can measure shape.I.P7S_UW.o. III.P7S_UW.oTr2A_U06U04Can cooperate with other people during team work and take a lead a team.I.P7S_UOTr2A_U06Tr2A_U06Tr2A_U06III.P7S_UW.o. II.P7S_UW.oTr2A_U06Tr2A_U06Tr2A_U06III.P7S_UOTr2A_U06Tr2A_U06III.P7S_UOTr2A_U20KS01Can think and act in a creative and enterprising way.I.P7S_KOTr2A_K04	U01 Is able to synthesize th		e measurement path with the use of	I.P7S UW.o.	Tr2A U06			
U02Can estimate selected characteristics and interpret the results.I.P7S_UW.o. III.P7S_UW.oTr2A_U06U03Can measure shape.I.P7S_UW.o. III.P7S_UW.oTr2A_U06U04Can cooperate with other people during team work and take a lead a team.I.P7S_UOTr2A_U20Marking outcomes in the field of social competencesKS01Can think and act in a creative and enterprising way.I.P7S_KOTr2A_K04		computer techniques.	1	III.P7S_UW.o	_			
U03Can measure shape.I.P7S_UW.o. III.P7S_UW.oTr2A_U06U04Can cooperate with other people during team work and take a lead a team.I.P7S_UOTr2A_U20Tr2A_U20Tr2A_U20Tr2A_U20Tr2A_U20KS01Can think and act in a creative and enterprising way.I.P7S_KOTr2A_K04	U02	Can estimate selected of	characteristics and interpret the results.	I.P7S_UW.o. III.P7S_UW.o	Tr2A_U06			
U04       Can cooperate with other people during team work and take a lead a team.       I.P7S_UO       Tr2A_U20 <i>Assumed learning outcomes in the field of social competences</i> I.P7S_KO       Tr2A_K04         KS01       Can think and act in a creative and enterprising way.       I.P7S_KO       Tr2A_K04	U03	Can measure shape.		I.P7S_UW.o. III.P7S_UW.o	Tr2A_U06			
Assumed learning outcomes in the field of social competences           KS01         Can think and act in a creative and enterprising way.         I.P7S_KO         Tr2A_K04	U04	Can cooperate with oth lead a team.	er people during team work and take a	I.P7S_UO	Tr2A_U20			
KS01 Can think and act in a creative and enterprising way. I.P7S_KO Tr2A_K04		Assur	ned learning outcomes in the field of soci	ial competences				
	KS01	Can think and act in a	creative and enterprising way.	I.P7S_KO	Tr2A_K04			

## Studia stacjonarne drugiego stopnia na kierunku Transport – profil ogólnoakademicki Card of Course **Measurement Systems in Transportation Practice**

				1	1	1		
Form of didactic studies and number of hours		Lecture	Exercise	Laboratory	Project	Other		
On a weekly plan		1	0	1	0	0		
Throughout	the semester	15	0	15	0	0		
Contonto of								
Contents of education - separately for each form of didactic studies		Lecture: Division and classification of physical signals. Overview of selected sensors used in transport technology - the physical basis of their operation, structure, properties, basic static and dynamic characteristics. Examples of measuring systems with serial and parallel interfaces, wireless measuring systems. Selected aspects of signal processing, analog-to-digital conversion, sampling theorem. 3D measurement techniques. Digital representation of measurement results and the possibility of using it to control autonomous vehicles. Laboratories: Selected aspects in the field of construction, operation, functionality of measurement tracks with the use of types of sensors used in transport technology. Determination and interpretation of selected signal characteristics. 3D measurement with non-contact						
Teaching m	ethods	Lecture:						
Teaching methods		Lecture: Lecture enriched with a multimedia presentation and sketches made during the presentation, discussion. Laboratories:						
Methods of	verification of effects	of education		,				
No. effect		<u>-</u> J	Methods of ve	rification				
		Assumed learning	g outcomes in ter	ms of knowledge				
W01	Colloquium from the	lecture, 2 open qu	estions. correct a	nswer required at	50%.			
W02	Colloquium from the lecture, 2 open questions, correct answer required at 50%							
W03	Colloquium from the	lecture, 2 open qu	estions, correct a	nswer required at	50%.			
	· •	Assumed learn	ing outcomes in	terms of skills				
U01	Correct execution of exercises, preparation of reports.							
U02	Correct execution of	Correct execution of exercises, preparation of reports.						
U03	Correct execution of	exercises, prepara	tion of reports.					
U04	Correct execution of	exercises, prepara	tion of reports.					
	Assur	ned learning outc	comes in the field	of social compete	ences			
KS01	Correct execution of	exercises, prepara	tion of reports.					
Methods of evaluation		Lecture: The condition for passing the lectures is to obtain positive grades from both tests, and the final grade for the lectures is issued on the basis of the arithmetic mean of the grades from these tests. Laboratories:						
		The condition for passing the laboratory exercises is to obtain a positive grade from all reports and tests of the companionway type, where the final grade for laboratory exercises is issued on the basis of the arithmetic mean of the unit grades. Integrated assessment:						
		The condition for passing the course is to obtain positive grades for passing the lecture part and for passing the laboratories, while the final grade for the course is issued on the basis of calculating the weighted average of the grades for the lecture part with a weight of 0.4 and a laboratory weight of 0.6.						
Exam		No						
Literature		Basic literature: Basic literature: 1. John P. Bentley, Principles of Measurement Systems, ISBN 0 130 43028 5, 2005; web: <u>http://research.iaun.ac.ir/pd/imanianold/pdfs/HomeWork_8460.pdf</u> Supplementary literature:						

	2. Robert Czabanowski, SENSORY I SYSTEMY POMIAROWE, Dolnośląska Bibliotoka Cyfrawa, Balitachnika Wrachwylka, 2010r		
	Biblioleka Cylrowa, Politechnika wrociawska, 2010r.,		
	http://www.dbc.wroc.pl/Content//205/czabanowski_sensory.pdf;		
	3. Krzysztof Karbowski, Podstawy rekonstrukcji maszyn i innych obiektów w		
	procesach wytwarzania, Politechnika Krakowska, 2008r. (via www)		
Website of the course	www.epw.pw.edu.pl		
<b>D.</b> Student's activity			
Number of ECTS credits	3		
Number of hours of student's	88 hours, including: work on lectures 15 hours, work on laboratory exercises 15		
work to achieve effects of	hours, preparation for the lecture test 11 hours, preparation for laboratory classes 10		
education	hours, preparation of reports 25 hours, consultations 3 hours, (including		
	consultations in the field of the laboratory 2 hours) studying the literature of the		
	subject 9 hours		
Number of ECTS credits on the	1.5 points ECTS (33 hours, including: work on lectures 15 hours, work on laboratory		
course with direct participation	exercises 15 hours consultations 3 hours)		
of academic teacher	excluses 15 hours, consultations 5 hours)		
Number of ECTS credits on	2.0 points ECTS (52 hours, including: work on laboratory exercises 15 hours,		
practical activities on the course	preparation for laboratory classes 10 hours, preparation of reports 25 hours,		
	consultation in the laboratory 2 hours)		
E. Additional information			
Notes	As long as it does not cause changes in the relationship of a given subject with the		
	directional effects in the content of education, changes may be introduced on an		
	ongoing basis, taking into account the latest scientific achievements.		
Date of last edition	2021-08-25 21:55:59		