FACULTY OF MECHANICAL ENGINEERING

THE OFFER STUDIES FOR FOREIGN STUDENTS IN THE FRAMEWORK OF THE ERASMUS PROGRAMME:

OCCUPATIONAL SAFETY AND HEALTH

THE OFFER OF SUBJECTS FOR AREA OF STUDY:OCCUPATIONAL SAFETY AND HEALTH

(MINIMUM NUMBER OF HOURS AND ECTS)

Offer of Subjects in English	Numbers of hours	ECTS
Elements of Automation	30	3
Mechatronics	30	3
Technical Suitability of Machines and Devices	45	2
Fundamentals of Electrical Engineering and Electronics	45	4
Computer Application Programs	45	3
Integrated Management Systems in Organizations	30	1
Technical Drawing	30	3
Engineering Graphics and Fundamentals of Engineering Design	30	3
Multimedia Techniques	30	5
Computer Support of Teaching	30	1

Elements of Automation

Course code: 06.9-WM-BHP-P-51

Course type: obligatory

Teaching language: Polish, English

Director of studies:: dr inż. Piotr Gawłowicz

Name of lecturer: dr inż. Paweł Bachman
dr inż. Marcin Chciuk
dr inż. Piotr Gawłowicz

The class form	Number of teaching hours per semester	Number of teaching hours per week	Semester	Form of receiving a credit for a course	Number of ECTS credits allocated
Full-time studies					3
Lecture	15	1	III	Credit with grade	
Laboratory	15	1		Credit with grade	
Part-time studies					
Lecture	9	0,6	III	Credit with grade	
Laboratory	9	0,6		Credit with grade	

AIM OF THE COURSE:

The main result of this course is to know the automation and robotization of technological processes.

PREREQUISITES:

Fundamentals of physics, electrical engineering, electronics and computer science.

SCOPE:

Basics of automation. Control and control systems. Regulators. Stability of automatic control systems. Application of industrial automatic control systems and manipulators and robots in the technological processes of production of materials, machine elements and machine assembly processes. Computer-aided design systems for automated and robotized technological processes.

TEACHING METHODS

Lecture, laboratory

LEARNING OUTCOMES AND METHODS OF THEIRS VERIFICATION:

Outcome symbols	Outcome description	Methods of verification
K_K11 K_K12 K_K14	The student is able to perform laboratory exercises in the group according to the instruction, cooperate with other members and work taking different roles in the group.	Activity during the class Current control in class

		Observation and assessment of activity in the classroom
K_U08	Student can, while formulating and solving engineering tasks related to industrial automation, integrate knowledge in other fields of science and disciplines appropriate to the studied field of study and apply a systemic approach, including non-technical aspects. The student is able to plan and conduct experiments using measuring devices such as electrical value meters, oscilloscopes, computer control and measurement cards, computer simulations, interpret the results and draw conclusions. Student can use to formulate and solve engineering tasks using simulation methods using specialized computer programs and using previously designed experiments. Student is able to perform critical analysis of how the automation system works and assess existing technical solutions, in particular devices, objects, systems and processes. Student can assess the suitability of many different methods and tools for solving automation and robotics engineering tasks and choose the most suitable and practical applications.	Activity during the class Current control in class Observation and assessment of activity in the classroom Test
K_W23	The student has basic knowledge of commonly used objects and systems of automation of drives and electronic components, knows the cycle of their design, manufacture, use and disposal. Student knows the basic methods, techniques, tools and materials used to solve simple engineering tasks in the field of automation and robotization of industrial processes.	Test

FORM OF ASSIGNMENT:

The final grade is the average of the lab and the lecture, provided they receive both positive grades.

WORKLOAD:

Workload	Hours	
	Full-time studies	Part-time studies
Contact hours (classes, tutorials, exams, etc.)	40	35
Self studies (set up to: classes, exams, reading literature, dissertations, projects, presentations, reports, speeches)	35	40
In total	75	75
ECTS points	3	3

RECOMMENDED READING:

1. Barczyk J.: Automatyzacja procesów dyskretnych, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa, 2003.
2. Kwiecień R.: Komputerowe systemy automatyki przemysłowej, Helion, Gliwice, 2013.
3. Mikulczyński T.: Automatyzacja procesów produkcyjnych, WNT, Warszawa, 2006.
4. Szafarczyk M., Śniegulska-Grądzka D., Wypysiński R., Podstawy układów sterowań cyfrowych i komputerowych, PWN, Warszawa, 2007.
5. Urbaniak A.: Podstawy automatyki, Wydawnictwo Politechniki Poznańskiej, Poznań, 2004.
6. Zdanowicz R., Robotyzacja dyskretnych procesów produkcyjnych, Wydawnictwo Politechniki Śląskiej, Gliwice, 2009.

FURTHER READING:

1. Brzózka J.: Regulatory i układy automatyki, MIKOM, Warszawa, 2004.
2. Elementy automatyzacji we współczesnych procesach wytwarzania, praca zbiorowa pod redakcją Mieczysława Marciniaka, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa,2007.
3. Kozłowski K., Dutkiewicz P., Wróblewski W.: Planowanie zadań i programowanie robotów, Wydawnictwo Politechniki Poznańskiej, Poznań, 1999.
4. Podstawy robotyki. Teoria i elementy manipulatorów i robotów. Praca zbiorowa pod redakcją Adama Moreckiego i Józefa Knapczyka, WNT, Warszawa, 1999.
5. Zawadzka L.: Współczesne problemy i kierunki rozwoju elastycznych systemów produkcyjnych, Wydawnictwo Politechniki Gdańskiej, Gdańsk, 2007.
6. Zdanowicz R., Robotyzacja procesów technologicznych, Wydawnictwo Politechniki Śląskiej, Gliwice, 2002.

Mechatronics

Course code: 06.9-WM-BHP-P-45

Course type: obligatory

Teaching language: Polish, English

Director of studies:: dr inż. Marcin Chciuk

Name of lecturer: dr inż. Paweł Bachman
dr inż. Marcin Chciuk
dr inż. Piotr Gawłowicz

The class form	Number of teaching hours per semester	Number of teaching hours per week	Semester	Form of receiving a credit for a course	Number of ECTS credits allocated
Full-time studies					3
Lecture	15	1	IV	Credit with grade	
Laboratory	15	1		Credit with grade	
Part-time studies					
Lecture	9	0,6	IV	Credit with grade	
Laboratory	9	0,6		Credit with grade	

AIM OF THE COURSE:

The main result of this course is to know the mechatronic systems, drive types and sensory systems.

PREREQUISITES:

Fundamentals of electrical engineering and electronics, fundamentals of computer science, fundamentals of automatics and control, mechanics, fundamentals of machine construction.

SCOPE:

Elements of mechatronics. Mechatronic systems. Hydraulic, pneumatic and servo motors. Sensors: parameters and operating principles. Application of sensors for kinematic and dynamic measurements. Signals and signal processing. Computer-aided systems in mechatronics and machine drive design.

TEACHING METHODS

Lecture, laboratory

LEARNING OUTCOMES AND METHODS OF THEIRS VERIFICATION:

Outcome symbols	Outcome description	Methods of verification
K_K11 K_K12 K_K14	The student is able to perform laboratory exercises in the group according to the instruction, cooperate with other members and work taking different roles in the group.	Activity during the class Current control in

		class Observation and assessment of activity in the classroom
K_U08	Student can, while formulating and solving engineering tasks related to industrial automation, integrate knowledge in other fields of science and disciplines appropriate to the studied field of study and apply a systemic approach, including non-technical aspects. The student is able to plan and conduct experiments using measuring devices such as electrical value meters, oscilloscopes, computer control and measurement cards, computer simulations, interpret the results and draw conclusions. Student can use to formulate and solve engineering tasks using simulation methods using specialized computer programs and using previously designed experiments. Student is able to perform critical analysis of how the automation system works and assess existing technical solutions, in particular devices, objects, systems and processes. Student can assess the suitability of many different methods and tools for solving automation and robotics engineering tasks and choose the most suitable and practical applications.	Activity during the class Current control in class Observation and assessment of activity in the classroom Test
K_W47	The student knows the typical engineering technologies in the field of mechatronics in the use of computer-aided techniques in the design of structural elements of mechatronic devices. The student has a basic knowledge of commonly used in the objects and systems of the mechatronic effectors and sensors and accompanying electronic components and they know the cycle of their design, manufacture, use and disposal. Student knows the basic methods, techniques, tools and materials used to solve simple engineering tasks in the field of mechatronics.	Test

FORM OF ASSIGNMENT:

The final grade is the average of the lab and the lecture, provided they receive both positive grades.

WORKLOAD:

Workload	Hours	
	Full-time studies	Part-time studies
Contact hours (classes, tutorials, exams, etc.)	40	35
Self studies (set up to: classes, exams, reading literature, dissertations, projects, presentations, reports, speeches)	35	40
In total	75	75
ECTS points	3	3

RECOMMENDED READING:

1. Gawrysiak M., Analiza systemowa urządzenia mechatronicznego, Wydawnictwo Politechniki Białostockiej, Białystok, 2003.
2. Heimann B., Gerth W., Popp K., Mechatronika – komponenty, metody, przykład, PWN, Warszawa, 2001.
3. Miłek M., Metrologia elektryczna wielkości nieelektrycznych, Oficyna Wydawnicza Uniwersytetu Zielonogórskiego, Zielona Góra, 2006.

4. Mrozek Z., Komputerowo wspomagane projektowanie systemów mechatronicznych, Zeszyty Naukowe Politechniki Krakowskiej, seria Inżynieria Elektryczna i Komputerowa, nr 1, Kraków, 2002.
5. Stryczek S., Napęd hydrostatyczny tom I i II, WNT, Warszawa, 2005.
6. Szejnach W., Napęd i sterowanie pneumatyczne, WNT, Warszawa, 2005

FURTHER READING:

1. Elektrotechnika i elektronika dla nieelektryków, praca zbiorowa, WNT, Warszawa, 2004.
2. Grono A.J., Mechatronika - laboratorium, Wydawnictwo Politechniki Gdańskiej, Gdańsk, 2004.
3. Mrozek B., Mrozek Z.: Matlab i Simulink, Helion, Gliwice, 2004.
4. Osiecki A., Hydrostatyczny napęd maszyn, WNT, Warszawa, 2004.
5. Podstawy robotyki. Teoria i elementy manipulatorów i robotów. Praca zbiorowa pod redakcją Adama Moreckiego i Józefa Knapczyka, WNT, Warszawa, 1999.
6. Uhl. T., Wybrane problemy projektowania mechatronicznego, Wydawnictwo Katedry Robotyki i Dynamiki Maszyn, AGH, Kraków, 1999.

Technical Suitability of Machines and Devices

Course code: 06.9-WM-BHP-P-38

Course type: obligatory

Teaching language: Polish, English

Director of studies:: dr inż. Paweł Bachman

Name of lecturer: dr inż. Paweł Bachman

The class form	Number of teaching hours per semester	Number of teaching hours per week	Semester	Form of receiving a credit for a course	Number of ECTS credits allocated
Full-time studies					2
Lecture	15	1	VII	Credit with grade	
Laboratory	30	2		Credit with grade	
Part-time studies					
Lecture	9	0,6	VII	Credit with grade	
Laboratory	18	1,2		Credit with grade	

AIM OF THE COURSE:

To familiarize students with the principles of technical diagnostics, which deals with the non-assembly evaluation of the technical condition of machines. Knowing the methods of examining the technical condition of machines indirectly by controlling the properties of the working processes or the accompanying machines, and by examining the properties of machine products, without disassembling the tested machines, based on measurement of diagnostic signals and their comparison with nominal values.

PREREQUISITES:

Machine construction basics. Safety Engineering.

SCOPE:
Ways of machine wear. Assessment of technical condition and unbalance analysis of rotor machine. Evaluation of the technical condition of rolling bearings. Evaluation of the technical condition of the gears. Evaluation of the technical condition of the aggregate. Infrared. Vibro-acoustics. Regulations on technical conditions for technical supervision of various machines and equipment.

TEACHING METHODS:
Lecture, laboratory

LEARNING OUTCOMES AND METHODS OF THEIRS VERIFICATION:

Outcome symbols	Outcome description	Methods of verification
K_K11 K_K09	Able to interact and work in a group, assuming different roles. He can think and act in an entrepreneurial way, he knows that quickly detecting a problem in malfunctioning machinery and removing a breakdown can prevent workers from accident and the entrepreneur from huge losses	Activity during the class Current control in class Observation and assessment of activity in the classroom
K_U12	It can measure the performance of machinery and equipment and assess whether the machine meets the technical conditions for its release and anticipates its possible failure in the near future.	Activity during the class Current control in class Observation and assessment of activity in the classroom
K_W12	He knows what is the diagnosis of machines and devices.	Activity during the class Current control in class Observation and assessment of activity in the classroom

FORM OF ASSIGNMENT:
The final grade is the average of the lab and the lecture, provided they receive both positive grades.

WORKLOAD:

Workload	Hours	
	Full-time studies	Part-time studies
Contact hours (classes, tutorials, exams, etc.)	40	30
Self studies (set up to: classes, exams, reading literature, dissertations, projects, presentations, reports, speeches)	10	20
In total	50	50
ECTS points	2	2

RECOMMENDED READING:

1. Kokociński Janusz, Wibroakustyczna diagnostyka maszyn, Energetyka Cieplna i Zawodowa 11 /2009
2. Legutko stanisław, Eksploatacja maszyn, Wydawnictwo Politechniki Poznańskiej, Poznań 2007
3. Macha Ewald, Niezawodność maszyn, skrypt nr 237 Politechnika Opolska 2001
4. Borkowski Stanisław, Selejdak Jacek, Salomon Szymon, Efektywność eksplowatacji maszyn i urządzeń, Sekcja Wydawnictw Wydziału Zarządzania Politechniki Częstochowskiej, Częstochowa 2006
5. Żółtowski Bogdan, Podstawy diagnostyki maszyn, Bydgoszcz 1996

FURTHER READING:

1. Rozporządzenie ministra gospodarki z dnia 30 października 2002 r. w sprawie minimalnych wymagań dotyczących bezpieczeństwa i higieny pracy w zakresie użytkowania maszyn przez pracowników podczas pracy.
6. Ustawa z dnia 21 grudnia 2000 r. o dozorze technicznym
7. Rozporządzenie ministra gospodarki z dnia 10 lipca 2001 r. w sprawie warunków technicznych dozoru technicznego, jakim powinny odpowiadać przenośniki kabinowe i krzesełkowe.
8. Rozporządzenie ministra gospodarki z dnia 18 września 2001 r. w sprawie warunków technicznych dozoru technicznego, jakim powinny odpowiadać zbiorniki bezciśnieniowe i niskociśnieniowe przeznaczone do magazynowania materiałów ciekłych zapalnych.
9. Rozporządzenie ministra gospodarki z dnia 28 grudnia 2001 r. w sprawie warunków technicznych dozoru technicznego, jakim powinny odpowiadać dźwigniki.
10. Rozporządzenie ministra gospodarki z dnia 16 kwietnia 2002 r. w sprawie warunków technicznych dozoru technicznego, jakim powinny odpowiadać zbiorniki bezciśnieniowe i niskociśnieniowe przeznaczone do magazynowania materiałów trujących lub żrących.
11. Jankowiak Paweł, Badanie niezawodności linii do formowania kęsów ciasta chlebowego, Zeszyty Naukowe Politechniki Poznańskiej Nr 64 Maszyny Robocze i Transport 2011
12. Osypiuk Roman Wiktor, Wycena maszyn i urządzeń, skrypt, 2007
13. Legutko Stanisław, Trendy rozwoju utrzymania ruchu urządzeń i maszyn, Eksploatacja i Niezawodność nr 2/2009
14. Tomczyk Wiesław, Uwarunkowania racjonalnego procesu użytkowania maszyn i urządzeń rolniczych, Inżynieria Rolnicza 7/2005

Fundamentals of Electrical Engineering and Electronics

Course code: 06.9-WM-BHP-P-48

Course type: obligatory

Teaching language: Polish, English

Director of studies:: dr inż. Marcin Chciuk

dr inż. Paweł Bachman

Name of lecturer: dr inż. Marcin Chciuk

dr inż. Piotr Gawłowicz

The class form	Number of teaching hours per semester	Number of teaching hours per week	Semester	Form of receiving a credit for a course	Number of ECTS credits allocated
Full-time studies					4
Lecture	15	1	II	Credit with grade	
Laboratory	30	2		Credit with grade	
Part-time studies					
Lecture	9	0,6	II	Credit with grade	
Laboratory	18	1,2		Credit with grade	

AIM OF THE COURSE:

The main result of this course is to know the electrical phenomena and their use in technics.

PREREQUISITES:

Fundamentals of physics

SCOPE:

Fundamentals of electrostatics and electromagnetism. Circuits DC and AC. Calculation of currents and voltages in electrical circuits branched direct and alternating current method of Kirchhoff's laws and the loop analysis method. Power and energy in single and three phase circuits. Calculation of power in sinusoidal circuits. Transformer. Machines: serial and shunt DC current and asynchronous and synchronous AC current. Electric motors. The structure and design of electric drive. Semiconductor elements: diodes, transistors, thyristors, power amplifiers, operational amplifier. Methods of generating electric's oscillations, generators. Rectifier circuits and power supply. Stabilized parametric compensation and pulse power supply. Digital circuits. Electronic circuits - measurement and drive systems. Digital arithmetic and logic functions. Selected digital semiconductors. Architecture of microcomputers. Elements of microprocessor technology.

TEACHING METHODS:

Lecture, laboratory

LEARNING OUTCOMES AND METHODS OF THEIRS VERIFICATION:

Outcome symbols	Outcome description	Methods of verification
K_K11 K_K12 K_K14	The student is able to perform laboratory exercises in the group according to the instruction, cooperate with other members and work taking different roles in the group.	Activity during the class Current control in class Observation and assessment of activity in the classroom
K_U04 K_U07 K_U08	The student is able to plan and conduct experiments using measuring devices such as electrical value meters, oscilloscopes, computer control and measurement cards, computer simulations, interpret the results and draw conclusions. The student is able to obtain information from literature, databases, the internet and other properly selected sources, also in English or another foreign language recognized as the language of international communication in the field of electrical engineering and electronics; It can integrate the information obtained, interpret it, draw conclusions, formulate and justify opinions. Student can use to formulate and solve engineering tasks using simulation methods using specialized computer programs and using previously designed experiments. The student is able to assess the suitability of many different methods and tools for solving practical engineering tasks related to electrical engineering and electronics, and to select and apply the right method and tools.	Activity during the class Current control in class Observation and assessment of activity in the classroom Test
K_W33	The student knows the basic methods, techniques, tools and materials used to solve complex electrical engineering and electronics engineering tasks. The student is knowledgeable in mathematics, physics, chemistry and other fields appropriate for the study area of study, useful for formulating and solving simple tasks in the field of electrical engineering and electronics. The student has a basic knowledge of the electrical and electronic equipment used in objects and systems, and knows the cycle of their design, manufacture, use and disposal.	Test

FORM OF ASSIGNMENT:

The final grade is the average of the lab and the lecture, provided they receive both positive grades.

WORKLOAD:

Workload	Hours	
	Full-time studies	Part-time studies
Contact hours (classes, tutorials, exams, etc.)	65	50
Self studies (set up to: classes, exams, reading literature, dissertations, projects, presentations, reports, speeches)	35	50
In total	100	100
ECTS points	4	4

RECOMMENDED READING:

1. Elektrotechnika i elektronika dla nieelektryków, praca zbiorowa, WNT, Warszawa, 2004.

2. Horowitz Paul, Hill Winfield: Sztuka elektroniki cz.1 i cz.2, WKŁ, Warszawa, 2003.

3. Pazdro K., Poniński M.: Miernictwo elektryczne WNT Warszawa 1986.

4. Rusek M., Pasierbiński J.: Elementy i układy elektroniczne w pytaniach i odpowiedziach, WNT, Warszawa, 2003.

5. Shamieh C., McComb G.: Elektronika dla bystrzaków, Helion, Gliwice, 2012.

6. Watson John: Elektronika, WKŁ, Warszawa, 2002.

7. Wrotek W.: Elektronika z Excelem. Helion, Gliwice, 2012.

FURTHER READING

1. Bolkowski S., Teoria obwodów elektrycznych, Wydawnictwa Naukowo-Techniczne, Warszawa, 1995.

2. Kacejko L.: Pracownia elektrotechniczna, PWSZ Warszawa 1963.

3. Kurdziel R., Podstawy elektrotechniki, Wydawnictwa Szkolne i Pedagogiczne, Warszawa, 1975.

4. Mikołajuk K., Trzaska Z., Zbiór zadań z elektrotechniki teoretycznej. PWN, Warszawa, 1973.

5. Miłek M.: Metrologia elektryczna wielkości nieelektrycznych, Oficyna Wydawnicza Uniwersytetu Zielonogórskiego, Zielona Góra, 2006.

6. Nührmann D.: Elektronika łatwiejsza niż przypuszczasz WKiŁ Warszawa 1979.

7. Szafarczyk M., Śniegulska-Grądzka D., Wypysiński R., Podstawy układów sterowań cyfrowych i komputerowych, PWN, Warszawa, 2007.

Computer Application Programs

Course code: 06.9-WM-BHP-P-49

Course type: obligatory

Teaching language: Polish, English

Director of studies:: dr inż. Marcin Chciuk

Name of lecturer: dr inż. Paweł Bachman
dr inż. Marcin Chciuk
dr inż. Piotr Gawłowicz

The class form	Number of teaching hours per semester	Number of teaching hours per week	Semester	Form of receiving a credit for a course	Number of ECTS credits allocated
Full-time studies					3
Lecture	15	1	III	Credit with grade	
Laboratory	30	2		Credit with grade	
Part-time studies					
Lecture	9	0,6	III	Credit with grade	
Laboratory	18	1,2		Credit with grade	

AIM OF THE COURSE:

The main result of this course is to know the database software and expert system supporting the management of workplace health and safety.

PREREQUISITES:

Basic computer skills. Information technology. Fundamentals of Computer Science.

SCOPE:

Databases and relational databases. Fundamentals of artificial intelligence - knowledge base and expert systems for use in computerized management and management systems. Computer support in management and control systems.

TEACHING METHODS:

Lecture, laboratory

LEARNING OUTCOMES AND METHODS OF THEIRS VERIFICATION:

Outcome symbols	Outcome description	Methods of verification
K_K06	He is aware of the importance of computer aided management in the environment.	Activity during the class Current control in class

		Observation and assessment of activity in the classroom
K_W26 K_W43 K_W46	Student has basic knowledge in the basics of artificial intelligence and expert systems for use in computerized management and management systems. Has basic knowledge of computer-aided management of the environment.	Activity during the class Current control in class Observation and assessment of activity in the classroom Test
K_U03 K_U06	Student can perform computer simulation of propagation and influence of selected harmful factors in the work environment. Student is able to develop technical documentation using computer techniques.	Activity during the class Current control in class Observation and assessment of activity in the classroom Test

FORM OF ASSIGNMENT:

The final grade is the average of the lab and the lecture, provided they receive both positive grades.

WORKLOAD:

Workload	Hours	
	Full-time studies	Part-time studies
Contact hours (classes, tutorials, exams, etc.)	50	40
Self studies (set up to: classes, exams, reading literature, dissertations, projects, presentations, reports, speeches)	30	40
In total	80	100
ECTS points	3	3

RECOMMENDED READING:

1. Hernandez M.J.: Bazy danych dla zwykłych śmiertelników, MIKOM, Warszawa, 2004.
2. Kisielnicki J., Sroka H.: Systemy informacyjne biznesu – informatyka dla zarządzania, Wydawnictwo Placet, Warszawa, 2005.
3. Adamczewski P.: Zintegrowane systemy informatyczne w praktyce, MIKOM, Warszawa, 2003.
4. Jankowski B., Regmunt A.: Bazy danych. Uczymy się na przykładach, MIKOM, Warszawa, 2004.
5. Bubnicki Z.: Wstęp do systemów ekspertowych. PWN, Warszawa 1990.

FURTHER READING

1. Babicz W., Oprogramowanie do zarządzania bezpieczeństwem pracy, analiza i koncepcja budowy nowego systemu, [w:] Komputerowo Zintegrowane Zarządzanie, WNT, Warszawa 2011.
2. Górska E., Lewandowski J., Zarządzanie i organizacja środowiska pracy, WPW, Warszawa 2010.
3. Kłosowski M., Staszewski P., Funkcjonowanie i doskonalenie systemu zarządzania bhp w przedsiębiorstwie – studium przypadku, Komputerowo Zintegrowane Zarządzanie, Oficyna Wydawnicza PTZP, Opole 2014.

4. Luściński S., Rola systemów informatycznych zarządzania w rozwoju organizacji, Komputerowo Zintegrowane Zarządzanie, WNT, Warszawa 2011.
5. Suchocka M., Biernacki A., 10 lat użytkowania komputerowego systemu STER. „Bezpieczeństwo Pracy" 12/2007.
6. www.ciop.pl

Integrated Management Systems in Organizations

Course code: 06.9-WM-BHP-IBP-P-10

Course type: obligatory

Teaching language: Polish, English

Director of studies:: dr inż. Paweł Bachman

Name of lecturer: dr inż. Paweł Bachman

The class form	Number of teaching hours per semester	Number of teaching hours per week	Semester	Form of receiving a credit for a course	Number of ECTS credits allocated
Full-time studies					1
Laboratory	30	2	VII	Credit with grade	
Part-time studies					
Laboratory	18	1,2	VII	Credit with grade	

AIM OF THE COURSE:

The main result of this course is to familiarize students with basic issues related to systems for managing the organization's resources, inventory management, production capacity management, customer relations, information management systems for knowledge management in the organization, information systems for managing the company's health and safety. Perform complex planning and simulation operations with optimization of supply chain management and production, procurement and human resources management in the enterprise..

PREREQUISITES:

Basic knowledge of enterprise management. Ability to create presentations in Power Point.

SCOPE:

1. ERP systems - organization resource management.
2. MRP Systems - Inventory Management.
3. MRP II systems - management of production capacity.
4. CRM systems - customer relationship management.
5. Information systems for knowledge management in an organization.
6. Information systems for the management of occupational health and safety in the enterprise.
7. APS systems - performing complex planning and simulation operations with optimization.
8. SCM Systems - Supply Chain Management.
9. MES systems - production realization systems.
10. OMS systems - order management system.
11. Human resources management in the enterprise (human resources management, purpose, benefits).
12. Strategies in the company's business.

TEACHING METHODS:

Working with a printed source, didactic discussion

LEARNING OUTCOMES AND METHODS OF THEIRS VERIFICATION:

Outcome symbols	Outcome description	Methods of verification
K_K15	The student is able to recognize the possibilities of undertaking various entrepreneurial activities	Activity during the class Current control in class Observation and assessment of activity in the classroom
K_W39	Student has basic knowledge of organization and management and business activity, possesses knowledge of basic issues and problems of modern management and basic mechanisms of functioning of organization	Activity during the class Current control in class Observation and assessment of activity in the classroom
K_U43 K_U59	Student analyzes organizational structures against the background of economic phenomena; Analyzes the causes and processes of managing the team in the health and safety services. He is able to forecast processes and phenomena taking place in the organization using standard methods and tools in the field of human resources management; It analyzes social phenomena related to job evaluation.	Activity during the class Current control in class Observation and assessment of activity in the classroom

FORM OF ASSIGNMENT:

Grading classes is based on the assessed presentation. Finally, there is a written test. The final grade is determined on the basis of the mean of the scores from the classes and the colloquium, with the same weight, provided both positive grades are obtained.

WORKLOAD:

Workload	Hours	
	Full-time studies	Part-time studies
Contact hours (classes, tutorials, exams, etc.)	30	20
Self studies (set up to: classes, exams, reading literature, dissertations, projects, presentations, reports, speeches)	20	30
In total	50	50
ECTS points	2	2

RECOMMENDED READING:

1. Lech Przemysław – Zintegrowane systemy zarządzania ERP/ERP II, Warszawa 2003.
2. Zalewski Wojciech - Analiza systemów informatycznych wspomagających zarządzanie produkcją w wybranych przedsiębiorstwach, Politechnika Białostocka,
3. Suchocka M., Biernacki A., Kurowski J.: Narzędzia wspomagające zarządzanie bezpieczeństwem pracy w przedsiębiorstwie – komputerowy program STER, Bezpieczeństwo Pracy, CIOB-BP, Warszawa, 2000.
4. Praca zbiorowa, Ocena Ryzyka Zawodowego, Wykorzystanie programu STER, CIOPBP, Warszawa, 2008.

5. Joanna Ejdys, Urszula Kobylińska, Agata Lulewicz-Sas, ZINTEGROWANE SYSTEMY ZARZĄDZANIA JAKOŚCIĄ, ŚRODOWISKIEM I BEZPIECZEŃSTWEM PRACY, Oficyna Wydawnicza Politechniki Białostockiej, Białystok 2012
6. Małgorzata Pańkowska, Henryk Sroka, Jerzy Kisielnicki, Zintegrowane Systemy Informatyczne. Dobre praktyki wdrożeń.Wydawnictwo Naukowe PWN, Warszawa, 2012

FURTHER READING

1. NIZIŃSKI Stanisław, ŻÓŁTOWSKI Bogdan, INFORMATYCZNE SYSTEMY ZARZĄDZANIA EKSPLOATACJI OBIEKTÓW TECHNICZNYCH, OLSZTYN – BYDGOSZCZ - 2001r.
2. Adriana Kaszuba-Perz, Zastosowanie informatycznych systemów zarządzania w małych i średnich przedsiębiorstwach jako przejaw technologicznej modernizacji, Zakład Finansów i Bankowości Politechnika Rzeszowska im. I. Łukasiewicza

Technical Drawing

Course code: 06.9-WM-BHP-S1-EP-01_12
Type of course: Compulsory
Language of instruction: Polish
Director of studies: Dr eng. Renata Kasperska
Name of lecturer: Dr eng. Renata Kasperska

Form of instruction	Number of teaching hours per semester	Number of teaching hours per week	Semester	Form of receiving a credit for a course	Number of ECTS credits allocated
Full-time studies					3
Lecture	15	1	I	Grade	
Project	15	1		Grade	
Part-time studies					
Lecture	15	1	I	Grade	
Project	15	1		Grade	

COURSE AIM:

The aim of the course is the acquisition of the geometric basis of technical drawing, principles of its drafting and reading, as well as the practical application of known methods and principles of technical drawing for visualization of the engineering works.

ENTRY REQUIREMENTS:

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COURSE CONTENTS:

The lecture covers the following topics: Types and features of technical drawing. Standards for sheet formats, technical writing and graphic recording. The instruments used in technical drawing. Types of drawing lines and rules for their performance. Scales and title blocks. Handwritten sketching of objects. Rules for the implementation of prospective, axonometric and rectangular projections. Plotting of solids in axonometric and rectangular projections. General rules for dimensioning. Cross-sections - how to create and determination, the types of cross-sections. Determination of the features of surface element. Diagrams and assembly drawings. Graphical representation of machines connections.

The project developed the following topics: Sketching of objects. Cursive lettering type A. Drawing lines and title blocks. Axonometric projections of an object (diagonal dimetria and isomerism). Orthogonal projections of the object according to the European method. Dimensioning of projections in accordance with dimensioning rules. Straight cross-sections of objects.

TEACHING METHODS:

The conventional lecture, subject exercises carried out in accordance with the leading instructions.

LEARNING OUTCOMES:

Area outcomes	Description of learning outcomes	Directional outcomes
T1A_W03 T1A_W07	A student knows basic concepts, standards and rules of technical drawing. A student knows the different types and attributes of drawings, recognizes views, projections and cross-sections.	K_W45
T1A_U15 T1A_U16	A student has the ability to properly read of a technical drawing and can verify its correctness. A student can apply different methods of recording three-dimensional objects on a plane and is able to make yourself different types of technical drawings, including axonometric projections, rectangular projections, straight cross sections in accordance with the rules and principles.	K_U45
T1A_K02	A student is aware of the cooperation between the design engineer and contractor-manufacturer, and the responsibility for the correctness of the technical drawing. A student can use technical vocabulary in touch with others in the area of engineering work.	K_K045

LEARNING OUTCOMES VERIFICATION AND ASSESSMENT CRITERIA:

Lecture pass – the checking of the acquired knowledge and skills of practical implementation of technical drawing in the form of a colloquium - an evaluation depends on the reached threshold point.

Project pass – a final evaluation is the arithmetic average of all evaluations of performed subject exercise.

The final evaluation is the average of the lecture evaluation and the project evaluation.

STUDENT WORKLOAD:

The student workload of 80 hours, including a participation in lectures (15 hours) and project (15 hours), preparation for classes (30 hours), preparation for the grade (20 hours)

RECOMMENDED READING:

1. Buksiński T., Szpecht A.: Rysunek techniczny. Wyd. WSiP 2000.
2. Dobrzański T.: Rysunek techniczny maszynowy. Wyd. 22. WNT, Warszawa 2002.
3. Filipowicz K., Kowal A., Kuczaj M.: Rysunek techniczny. Wyd. Politechniki Śląskiej. Gliwice 2008.
4. Rydzanicz I., Rysunek techniczny jako zapis konstrukcji: zadania. Wyd. 3, WNT, Warszawa 2004.

OPTIONAL READING:

1. Filipowicz K., Kowal A.: Rysunek techniczny z ćwiczeniami. Wyd. Politechniki Śląskiej. Gliwice 2004.

Engineering Graphics and Fundamentals of Engineering Design

Course code: 06.9-WM-BHP-S1-EP-01_12
Type of course: Compulsory
Language of instruction: Polish
Director of studies: Dr eng. Renata Kasperska
Name of lecturer: Dr eng. Renata Kasperska

Form of instruction	Number of teaching hours per semester	Number of teaching hours per week	Semester	Form of receiving a credit for a course	Number of ECTS credits allocated
Full-time studies					3
Laboratory	30	2	II	Grade	
Part-time studies					
Laboratory	30	2	II	Grade	

COURSE AIM:

The aim of the course is to gain practical skills of the graphic presentation of machine elements and also the execution of engineering works projects using computer-aided design.

ENTRY REQUIREMENTS:

Basis of technical drawing.

COURSE CONTENTS:

The lab provides the following issues: Types of graphics and graphical notations used in engineering projects. Computer techniques in engineering graphics. A getting to know with the environment of computer-aided design system (CAD) as a tool supporting a graphical development of technical documentation and offers. Basic drawing tools. The shaping of objects geometry. Modifications objects. Types of lines and how to hatch. Layers, views and texts. Methods for the dimensioning of machine elements. Blocks and their attributes. Precision drawing and symbol libraries. Performing simple and complex technical drawings and diagrams. Elements of spatial modeling (simple solids and surfaces) and objects visualization.

TEACHING METHODS:

Laboratory exercises using computers (instructions prepared by the lecturer).

LEARNING OUTCOMES:

Area outcomes	Description of learning outcomes	Directional outcomes
T1A_W03 T1A_W07	A student can define some basic concepts of engineering graphics and computer-aided design. He has news about basic methods of graphical, computer recording and reading of technical thought, knows computer techniques that let him perform basic 2D and 3D engineering drawings.	K_W12
T1A_U01 T1A_U15 T1A_U16	Based on a literature and a software documentation, a student can independently use the CAD system for modeling of engineering, graphics objects. The student has the ability to draw geometric objects using	K_U18

	functions of a computer program, is able to modify existing drawings, can indicate different methods of objects recording in the two-dimensional or three-dimensional space, and also can present the drawn object by its visualization. The student can create a technical documentation using computer techniques.	
InżA_K01	A student is aware of the impact of the improperly executed project to the further production process and the responsibility for the precise execution of a model.	K_K04

LEARNING OUTCOMES VERIFICATION AND ASSESSMENT CRITERIA:

The exam in the form of exercises, which summarize the whole realized material. The exam verifies competencies in carrying out drawings of geometric objects in the graphics environment and the using of software functions.

The final grade is the arithmetic mean of the positive ratings obtained from: (1) graphical drawing, (2) control exercises carried out at the laboratory after each batch of material (3) exercises summarizing the whole material (exam).

STUDENT WORKLOAD:

The student workload of 80 hours, including a participation in laboratory exercises (30 hours), an individual preparation for classes (30 hours), a preparation for control exercises (20 godzin).

RECOMMENDED READING:

1. Mazur J., Kosiński K., Polakowski K,, Grafika Inżynierska z wykorzystaniem metod CAD, Oficyna Wyd. Poltechniki Warszawskiej, Warszawa 2004.
2. Nieoczym A., Grafika inżynierska i podstawy konstruowania. Wyd. Wyższej Szkoły Przedsiębiorczości i Administracji w Lublinie, Lublin 2008.
3. Szymczak C., Elementy teorii projektowania. Wyd. Naukowe PWN, Warszawa 1998.
4. Tarnowski W., Wspomaganie komputerowe CAD/CAM – Podstawy projektowania technicznego. Wydawnictwo Naukowo-Techniczne, Warszawa 1997.

OPTIONAL READING:

1. Suseł M., Komputerowa grafika inżynierska. Zbiór zadań. Oficyna Wyd. Poltechniki Wrocławskiej, Wrocław 1999.
2. Suseł M., Makowski K.: Grafika inżynierska z zastosowaniem programu AutoCAD. Wyd. Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2005.
3. Wawer M., Grafika inżynierska. Przykłady modelowania 2D i 3D MegaCAD, wyd. Szkoła Główna Gospodarstwa Wiejskiego, 2005 i 2006.

Multimedia Techniques

Type of a subject: compulsory

Initial requirements: basic knowledge and abilities of ITC, including principles of IT and information system.

Language: polski Polish

Responsible for Subject: dr hab., Eunika Baron-Polańczyk, prof. UZ

Lecturer: dr hab., Eunika Baron-Polańczyk, prof. UZ

Type of classes	Hours per semester	Houes per week	Semester	Assessment	ECTS
Full time studies					5
Lecture	15	1	VI	PASS WITH GRADE	
Laboratory	15	1		PASS WITH GRADE	
Weekend Studies					
Lecture	15		VI	PASS WITH GRADE	
Laboratory	15			PASS WITH GRADE	

Topics:

Multimedia techniques versus projecting and constructing teaching resources; media, mass media, multimedia, hypermedia, multimedia didactic materials; projecting a didactic process with the use of multimedia; multimedia strategy of teaching.

Applications used to multimedia presentations; multimedia presentation materials – basic features of presentation, text and fonts, colour and sound, animation and video, presenting. Text and graphics, film and sound in multimedia presentations. Graphics: raster, vector 2D, vector 3D.

Application of hypertext techniques in science/technology/education: Internet navigation, regular searching and selecting text, digital and multimedia data; forms of presenting data; gathering and archiving text, number, graphic and media data with the use of Internet techniques; creating multimedia presentations and web pages, as well as the correct choice of component elements;

Modern tools of IT technology – they rise attractiveness and efficiency of teaching and learning processes: interactive blackboard, cyber desk, e-learning;

Interactive sources of information, their use at work and in education. The media library – information and didactic centre of work for a student and a teacher. Information workshops versus media education (programme assumptions of an education path; media education: education aims, school tasks, contents, achievements).

Use of the computer equipment and software in creating multimedia presentations; multimedia presentation materials – basic features of a presentation, recommendations concerning a text and fonts, colour and sound, animation and video; tips of carrying on a presentation.

New trends in a user-computer communication; service ergonomics, user's interface, supporting the service by users with dysfunctions (equipment and software solutions).

Media and mass communication versus the social system (media versus social and economy development; society: mass, information, network, media). Communication including contemporary multimedia techniques (means and forms of communication, models of the communication process).

Preparing and carrying on multimedia presentations and/or web pages helpful in the realization of the programme content of the studied specialization (project of a multimedia presentation helpful in the realization of programme content of the studied specialization; project of a presentation and web pages in the realization of programme content of the studied specialization).

Education effects:

Basic knowledge and abilities in the field of computer multimedia techniques: defining the role, place and tasks of modern multimedia technology in improving the attractiveness and efficiency of work processes and education; describing, explaining and analyzing the issue or possibilities of the computer equipment

and software in activities supporting theory and practice of work and education; projecting and creating multimedia presentation materials.

Conditions of getting a credit:

Lectures – in order to get a credit, it is necessary to get a positive grade of a written test that includes the above mentioned topics.

Lab – permanent assessment and positive grades of tests (written and/or oral) that include the above mentioned topics, of planned works, of prepared (in writing) issues/problems/tasks and their presentation.

BASIC LITERATURE:

1. Baron-Polańczyk E. (red.), Komputerowe wspomaganie dydaktyki, Oficyna Wydaw. UZ, Zielona Góra 2009.
2. Baron-Polańczyk E., Multimedialne materiały dydaktyczne. Projektowanie i wykorzystywanie w edukacji techniczno-informatycznej, Oficyna Wydaw. UZ, Zielona Góra 2006.
3. Baron-Polańczyk E., Multimedialne materiały prezentacyjne w dydaktyce techniki i informatyki [w:] M. Frejman (red.), Z problematyki edukacji nauczycielskiej studentów edukacji techniczno-informatycznej, Wydaw. UZ, Zielona Góra 2007.
4. Bednarek J., Multimedia w kształceniu. PWN, Warszawa 2006.
5. Boryczka B., Praktyczny przewodnik po Internecie dla bibliotekarzy, Bydgoszcz 2003.
6. Danowski B., Windows XP. Instalacja i naprawa, Helion, Gliwice 2005.
7. Fedak J., Fotografia cyfrowa od A do Z. Encyklopedia. MUZA SA, Warszawa 2006.
8. Foley J.D., Wprowadzenie do grafiki komputerowej. WNT, Warszawa 2001.
9. Gajda J., Juszczyk S., Siemieniecki B., Wenta K. (red.), Edukacja medialna, Wydaw. Adam Marszałek, Toruń 2002.
10. Goban-Klas T., Media i komunikowanie masowe, PWN, Warszawa 2004.
11. Goban-Klas T., Media i komunikowanie masowe. Teorie i analizy prasy, radia, telewizji i Internetu, Wydaw. PWN, Warszawa 2004.
12. Hetman J., Ustawa o prawie autorskim i prawach pokrewnych z przepisami wykonawczymi, Wydaw. Biblioteka Analiz, Warszawa 2007.
13. Juszczyk S., Człowiek w świecie elektronicznych mediów - szanse i zagrożenia, Wydaw. Uniwersytetu Śląskiego, Katowice 2000.
14. Kołodziej P., Komputerowe studio muzyczne i nie tylko. Przewodnik. Helion, Gliwice 2007.
15. Paul J., 100 sposobów na cyfrowe wideo, Helion, Gliwice 2007.
16. Pikoń K., ABC internetu. Wydanie V, Helion, Gliwice 2006.
17. Rosenfeld L., Morville P., Architektura informacji w serwisach internetowych, Gliwice 2003.
18. Schwartz S., Po prostu Access 2003 PL, przeł. Koronkiewicz P., Helion, Gliwice 2004.
19. Sokół M., Sokół R., Internet. Jak surfować bezpiecznie, Helion, Gliwice 2005.
20. Williams R., Tollet J., Projektowanie stron WWW. Jak to zrobić? Helion, Gliwice 2004.

EXTRA LITERATURE:

1. Baron-Polańczyk E., Multimedialne materiały dydaktyczne w edukacji techniczno-informatycznej w szkole podstawowej i gimnazjum. Raport z badań, Oficyna Wydaw. UZ, Zielona Góra 2007.
2. Baron-Polańczyk E., Praca nauczyciela wspomagana technologiami internetowymi [w:] Technologia Informacyjna i Komunikacyjna w Edukacji. Komputer i multimedia w pracy nauczyciela, Oficyna Wydaw. CDiDN w Szczecinie, Szczecin 2006, nr 3.
3. Bednarek J., Media w nauczaniu, Szkoła, Dydaktyka, Zadania, Wydaw. MICOM, Warszawa 2002.
4. Czasopisma popularno-naukowe: Komputer Świat, Chip, PC Word Komputer.
5. Gajda J., Media w edukacji, Wyd. „Impuls", Kraków 2002.
6. Jagodzińska M., Obraz w procesach poznawania rzeczywistości, Wydaw. WSiP, Warszawa 1991.
7. Jędryczkowski J., Prezentacje multimedialne w pracy nauczyciela, Oficyna Wydawnicza Uniwersytetu Zielonogórskiego, Zielona Góra 2008.
8. Langer M., Po prostu Excel 2002/XP PL, przeł. Kowalczyk M., Helion, Gliwice 2002.

9. Langer M., Po prostu Word 2003 PL, przeł. Masłowskiego K., Helion, Gliwice 2004.
10. Siemieniecki B. (red.), Technologia informacyjna w polskiej edukacji, Wydaw. Adam Marszałek, Toruń 2002.
11. Sokół M., Po prostu OpenOffice.ux.pl 2.0, Helion, Gliwice 2006.
12. Steinbrink B., Multimedia: u progu technologii XXI wieku, przełożyli M. Waśko, A. Amarowicz, Wydaw. Robomatic, Wrocław 1993.
13. Strykowski W. (red.), Media a edukacja, Wyd. eMPi2, Poznań 2000.

Computer Support of Teaching

Type of a subject: compulsory

Initial requirements: knowledge of the following subjects: pedagogics, general didactics, didactics of technology, IT, vocational subjects, computer techniques, information and communication technology.

Language: polski Polish

Responsible for Subject: dr hab., Eunika Baron-Polańczyk, prof. UZ

Lecturer: dr hab., Eunika Baron-Polańczyk, prof. UZ

Type of classes	Hours per semester	Houes per week	Semester	Assessment	ECTS
Full time studies					
Laboratory	30	2	VII	PASS WITH GRADE	1

Topics:

Supporting lessons using multimedia teaching resources. Reviewing and comparing the market offer for teaching technology and IT: multimedia encyclopedia, video cassettes, didactic packages, Internet programmes, multimedia books, sets to multimedia support of experiments, multimedia software, computer software. Types and quantities of multimedia teaching resources recommended by the Ministry of Education.

Using computer hardware and software for creating didactic multimedia presentations. Multimedia presentation materials – basic features of presentations, recommendations concerning fonts, a text, colour and sound, animation and video; tips connected with showing the presentation.

Using hypertext techniques in didactics. Internet navigation; proper searching for selecting text, digital, graphic and multimedia data; forms of presenting data; gathering and archiving text, digital, graphic and multimedia data with the use of Internet techniques; doing presentations and web pages, shaping the right choice of parameters.

Modern tools of information technology which are to rise attractiveness and efficiency of teaching and learning: interactive board, cyber desk, e-learning etc.

Interactive sources of information and their use at school. The media library – centre of information and didactics, place for work of a pupil/student and a teacher. Information workshop versus media education (assumptions of a programme educational path; media education: educational aims, school tasks, content, achievements).

Topics for working out by students themselves:

Didactic use of multimedia operating systems – Windows XP/Vista

Data compression in the modern realization of the didactic and upbringing process. Internet communication as a tool supporting the exchange of information between a teacher/tutor – a pupil/student – a parent.

Chosen teaching technology tools – their role and tasks in teaching and learning. A digital camera, camcorder, scanner, multimedia projector, computer (computer software, Internet), satellite TV.

New trends in the relation “user-computer”. Ergonomics of using a computer, user’s interface, supporting its use by the disabled users (equipment and software solutions).

Education effects:

Knowledge and abilities in the field of supporting teaching with modern computer technology: defining its role, places and tasks of the modern information and communication technology in rising attractiveness and efficiency of teaching and learning processes; describing, explaining and analyzing the essence and possibilities of the computer software and hardware in activities supporting theory and practice of education; projecting and constructing multimedia teaching materials.

Conditions of getting a credit:

Laboratory: getting positive grades of an oral or written quiz concerning the above mentioned topics or issues worked out in writing on a given topic and their presentation with the use of multimedia teaching materials and modern information and communication technology.

BASIC LITERATURE:

1. Baron-Polańczyk E. (red.), Komputerowe wspomaganie dydaktyki, Oficyna Wydaw. UZ, Zielona Góra 2009.
2. Baron-Polańczyk E., Multimedialne materiały dydaktyczne w edukacji techniczno-informatycznej w szkole podstawowej i gimnazjum. Raport z badań, Oficyna Wydaw. UZ, Zielona Góra 2007.
3. Baron-Polańczyk E., Multimedialne materiały dydaktyczne. Projektowanie i wykorzystywanie w edukacji techniczno-informatycznej, Oficyna Wydaw. UZ, Zielona Góra 2006.
4. Baron-Polańczyk E., Multimedialne materiały prezentacyjne w dydaktyce techniki i informatyki [w:] M. Frejman (red.), Z problematyki edukacji nauczycielskiej studentów edukacji techniczno-informatycznej, Wydaw. UZ, Zielona Góra 2007.
5. Baron-Polańczyk E., Multimedialne produkty edukacyjne do techniki i informatyki w ofercie polskich producentów i dystrybutorów branży IT [w:] B. Pietrulewicz (red.), Możliwości doskonalenia procesu kształcenia – wybrane zagadnienia, Wydaw. UZ, Zielona Góra 2005.
6. Baron-Polańczyk E., Praca nauczyciela wspomagana technologiami internetowymi [w:] Technologia Informacyjna i Komunikacyjna w Edukacji. Komputer i multimedia w pracy nauczyciela, Oficyna Wydaw. CDiDN w Szczecinie, Szczecin 2006, nr 3.
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9. Foley J.D., Wprowadzenie do grafiki komputerowej. WNT, Warszawa 2001.
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11. Gajda J., Media w edukacji, Wydaw. „Impuls", Kraków 2002.
12. Goban-Klas T., Media i komunikowanie masowe. Teorie i analizy prasy, radia, telewizji i Internetu, Wydaw. PWN, Warszawa 2004.
13. Hrycyk W., Nienaganna prezentacja, „Chip"' 6/98, Wrocław 1998.
14. Jagodzińska M., Obraz w procesach poznawania rzeczywistości, Wydaw. WSiP, Warszawa 1991.
15. Juszczyk S., Człowiek w świecie elektronicznych mediów - szanse i zagrożenia, Wydaw. Uniwersytetu Śląskiego, Katowice 2000.
16. Kołodziej P., Komputerowe studio muzyczne i nie tylko. Przewodnik. Helion, Gliwice 2007.
17. Paul J., 100 sposobów na cyfrowe wideo, Helion, Gliwice 2007.
18. Siemieniecki B. (red.), Technologia informacyjna w polskiej edukacji, Wydaw. Adam Marszałek, Toruń 2002.
19. Steinbrink B., Multimedia: u progu technologii XXI wieku, przełożyli M. Waśko, A. Amarowicz, Wydaw. Robomatic, Wrocław 1993.

EXTRA LITERATURE:

1. Bednarek J., Media w nauczaniu, Szkoła, Dydaktyka, Zadania, Wydaw. MICOM, Warszawa 2002.
2. Czasopisma popularno-naukowe: Komputer Świat, Chip, PC Word Komputer.Podobnie postępuj w przypadku kolejnych pozycji bibliograficznych literatury podstawowej wciskając
3. Dylak S., Wizualizacja w kształceniu nauczycieli, UAM, Poznań 1995.
4. Edukacja czytelnicza i medialna, http://www.men.waw.pl.
5. Goban-Klas T., Komputer narzędziem humanisty, Uniwersytet Jagielloński, Kraków 1993.
6. Kupisiewicz Cz., Dydaktyka ogólna, Wydaw. GRAF PUNKT, Warszawa 2000.
7. Okoń W., Wprowadzenie do dydaktyki ogólnej, Wydaw. „Żak", Warszawa 1998.
8. Pochanke H. (red.), Dydaktyka techniki, Wydaw. PWN, Warszawa 1985.
9. Rosch W., Multimedia od A do Z. Komputerowy przewodnik po mutimediach, Intersoftland, Warszawa 1997.
10. Strykowski W. (red.), Media a edukacja, Wydaw. eMPi2, Poznań 2000.