



Curriculum

Field of study: Modern Materials Design and Application

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General characteristics of the field of study

Basic information

Faculty name:	Faculty of Non-Ferrous Metals
Field of study:	Modern Materials Design and Application
Level:	Second-cycle (engineer) programme
Profile:	General academic
Form:	Full-time studies
ISCED classification:	0715
Number of ECTS credits necessary to complete studies at a given level:	90
Professional title awarded to graduates:	magister inżynier
Cycle start date:	2023/2024, summer semester
Duration of studies (number of semesters):	3

Field of science to which the field of study is assigned:

Field engineering and technical sciences

Discipline of science to which the field of study is assigned:

Discipline	Percentage	ECTS
Material Engineering	100%	90

Relationship between the field of study and the AGH University development strategy and the AGH University mission

Studies at the Faculty of Non-Ferrous Metals fulfill the development strategy and mission of the AGH University of Science and Technology in terms of extending students' skills in acquiring and utilizing knowledge, developing their logical, constructive, and forward-looking thinking, and also building an accurate reasoning with an optimal decision-making process. The priority of the strategy of the Faculty of Non-Ferrous Metals of the AGH UST in the field of Modern Materials Design and Application programme is the high quality of the education process and the best position of the faculty graduates on the labor market. Education is carried out in accordance with the mission and strategy delivered in the University's Statute.

Information on taking into account the socio-economic demand while creating the curriculum and indication of the assumed learning outcomes matching the identified demand

Modern Materials Design and Application studies programme guarantees the socio-economic demands through implementation to study programme key subjects for materials science and engineering of non-ferrous metals. Strategic subjects target development of advanced materials through designing process, application of modern synthesis and processing techniques including conventional or powder metallurgy, plastic working, heat treatment, and other advanced technologies featured for modern materials science. Social sciences, humanities, and economic courses are also included in the education program allowing for gaining socio-economic competencies necessary in engineering community and global market.

Education paths - scope in Polish and in English

None

Graduation paths - scope in Polish and in English

None

The names of the majors in Polish and in English

Name [pl]	Name [en]
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General information about the curriculum

Field of study: Modern Materials Design and Application

General information related to the curriculum (general learning objectives and employment opportunities, typical jobs and opportunities for graduate continuing education)

Modern Materials Design and Application (MMDA) master's degree program is an educational offer dedicated to graduate students with general background in materials science including materials physics, chemistry, and engineering. The coursework program of MMDA allows students to grow adept in the knowledge and skills of advanced materials and processing technologies. The programme encompasses lecture, seminar, project, and laboratory classes focused on the designing processes and materials, application of modern synthesis and processing techniques including plastic working, heat treatment, powder metallurgy and other advanced technologies featured for modern materials science. Courses and activities are aimed into better understanding structure-property-performance-application relationship and to give students an expertise in evaluating, designing, improving and fabrication of unique materials based on non-ferrous metals and alloys. Curriculum of MMDA introduces also courses allowing students to develop communication and presentation skills, entrepreneurial initiatives, teamwork, and leadership skills as well as socio-economic competencies.

Modern Materials Design and Application education programme aims at promoting highly qualified engineers dedicated for employment in non-ferrous metals industry particularly with major in materials science including advanced powder metallurgy techniques, advanced and non-conventional metal working and heat treatment processes as well as modern techniques for surface treatments. Graduates are well prepared for professional work in domestic and international industrial plants leading in designing and processing of non-ferrous metals, laboratories and research institutes, R&D departments, and academia. The graduates may continue education at the third-cycle degree studies with major in materials science and mechanical engineering.

Information on including the conclusions from the students and graduates careers monitoring in the curriculum

According to data received from AGH Career Center, graduates of the Faculty of Non-Ferrous Metals do not report any problems with employment in the industry and other related units requiring advanced expertise provided by the education programme of Modern Materials Design and Application. Statistical data show high employment rate of recent graduates of Faculty of Non-Ferrous Metals wherein 90% of graduates find a position immediately after graduation. Future labor market for alumni is ensured within national industrial plants and international companies related to non-ferrous metals.

Information on including the requirements and recommendations of the accreditation committees, in particular the Polish Accreditation Committee and industry accreditation committees in the curriculum

In recent years, at the Faculty of Non-Ferrous Metals, all fields of study have been accredited - institutional accreditation. The faculty received a high evaluation of its teaching activity. The Polish Accreditation Committee recommendations for procedure improvements have been implemented. By decision of October 16, 2017, No. 16 / KAT / 2017, the Faculty of Non-Ferrous Metals was classified by "A" scientific category.

Information on including examples of good practice in the curriculum

The priority of the strategy of the Faculty of Non-Ferrous Metals in the area of education is the high quality of the education process and the best position of the Faculty graduates on the labor market. Education is carried out in accordance with the mission and strategy set out in the University's Statute and is also in line with the latest world trends. Faculty employees systematically participate in conferences and seminars, as well as various dedicated courses, increasing their competencies. They update the content of the modules on an ongoing basis and implement modern teaching tools. The program is designed to ensure high course electivity within the modules. In addition, the faculty cooperates extensively with international and national research units, as well as with industry, which has a direct impact on the study programs. Regular student meetings in the form of seminars and lecture with representatives of the non-ferrous metals industry are organized. Industry specialists have also participated in the conduct of selected specialized modules for many years. A very good example of good practice is also the participation of students in the Erasmus + program, as well as the possibility of carrying out internships and diploma theses with industrial partners, as well as the work of the students as part of student research

group and projects implemented by employees of the Faculty of Non-Ferrous Metals. In addition, students can participate in additional classes (courses, training, study trips, internships) organized as part of the Integrated Development Program of the AGH University of Science and Technology in Krakow II (ZRP AGH II), co-financed by the Knowledge Education Development Operational Program 2014-2020, Axis III Higher education for the economy and development, Operation 3.5 Comprehensive universities programs (implementation period: 01/10/2019 - 30/09/2023).

Information on cooperation in the preparation of the curriculum with external stakeholders, in particular associations, professional and social organizations

As part of the work on improving the education offer of the Faculty in terms of its compatibility with the current expectations of the national and global market of the non-ferrous metals industry, as well as improving the quality of education of students at the Faculty of Non-Ferrous Metals, a number of planned activities have been implemented over the last few years. All the activities aimed to develop a new teaching system under the general name of Industry - Science - Industry - Graduate profile - Educational offer of Faculty of Non-Ferrous Metals. The Faculty of Non-Ferrous Metals actively participated in conferences and seminars organized by industry associations (SITMN - Association of Engineers and Technicians of Non-Ferrous Metals - SITMN) and business environment institutions for the non-ferrous metals industry (Economic Chamber of Non-Ferrous Metals and Recycling- IGMNiR). Conferences and seminars were mostly focused on: (i) the analysis of the professional competence of the Non-Ferrous Metals Faculty graduate, (ii) description of the current needs of the non-ferrous metals industry in terms of skills and competencies of future employees and (iii) the development of concept of continuous cooperation between scientific (including AGH-WMN) and industrial units in terms of education programme for the future engineers and employees of non-ferrous metals industrial units. Works on the upgrade of the education system includes: (i) comprehensive analysis of the requirements of the Polish and global labor market in the non-ferrous metals industry and other related units, (ii) a series of discussion panels with industry and academia representatives in terms of the required competencies of the current and future graduates, (iii) a series of discussion panels with students concerning classes, its conduction form and effective teaching techniques and strategies, (iv) a series of discussions with the academic teachers on the current education programmes, courses, modules, syllabuses, and students working load, (v) analysis of the student's satisfaction surveys, (vi) selection of leaders within individual subjects and modules.

Duration, rules and form of the practical placement

Not applicable

Admission criteria, rules and policies

Field of study: Modern Materials Design and Application

Description of competences expected from the candidate applying for admission to studies

The candidate applying for admission to the second-cycle studies shall have completed the first-cycle (Bachelor) degree study. At least the B-2 level English proficiency is required to be documented by English certificate or diploma supplement. The English proficiency requirement might also be verified during candidate interview. Graduates of the first-cycle studies with major in materials science and candidates with an interest in new and advanced materials and technologies are preferred as applicants.

Recruitment conditions, including the winners and finalists of the central level high school scientific Olympics, as well as winners of international and national contests

The admission to studies at Modern Materials Design and Application are compiled under the terms of the AGH University of Science and Technology Study Regulations specified for second-cycle degree studies (Resolution of the AGH UST Senate No. 62/2022 of May 25, 2022 and No. 60/2023 of May 31). Admission shall include submission of the declaration of qualification for studies through the on-line recruitment system and participation in the entrance examination confirming the achievement of selected directional learning outcomes. Only candidates with an engineer's degree are allowed to apply.

Details of the recruitment conditions are made available to candidates, among others, via the AGH Recruitment Centre website.

The expected limit of admissions to studies along with an indication of the minimum number of admitted candidates required to successfully launch a study cycle

The expected admission limit of 20 people. The minimum number of people admitted: 8 people.

Learning outcomes

Field of study : Modern Materials Design and Application

Knowledge

KEU symbol	Learning outcomes prescribed to a field of study	CEU symbol
MMDA2A_W01	Student has an extensive and well-established knowledge in the field of materials science of non-ferrous metals essential to understanding the processes relevant to materials engineering, in particular processing and metallography of non-ferrous metals	P7S_WG_A
MMDA2A_W02	Student has extended knowledge in the field of manufacturing techniques of semi- and final products, multicomponent non-ferrous metals composites developed by various synthesis and metal working processes	P7S_WG_A
MMDA2A_W03	Student has extended knowledge in designing and manufacturing of smart and modern materials for use in strategic sectors of the economy	P7S_WG_A, P7S_WG_A_Inz
MMDA2A_W04	Student knows and understands advanced measurement and research techniques for characterization of materials and products	P7S_WG_A
MMDA2A_W05	Student knows and understands advanced technological processes including the operational life cycle of machines, devices, facilities, technical systems as well materials in particular non-ferrous metals produced by non-conventional processes and advanced metal working techniques	P7S_WG_A, P7S_WG_A_Inz
MMDA2A_W06	Student knows and follows the occupational safety and health basic rules during conducting laboratory experiments	P7S_WG_A
MMDA2A_W07	Student knows and understands physical, mathematical, statistical and IT principles necessary for the interpretation, processing, and evaluation of measured data	P7S_WG_A
MMDA2A_W08	Student knows and understands the fundamental dilemmas of modern civilization; economic, legal, ethical, and other conditions for various types of professional activity related to the field of study Modern Materials Design and Application	P7S_WK_A, P7S_WK_A_Inz

Skills

KEU symbol	Learning outcomes prescribed to a field of study	CEU symbol
MMDA2A_U01	Student is able to utilize acquired knowledge to solve advanced engineering problems, including the selection of materials for various applications and innovative processes that enable obtaining modern materials with defined properties and other operating parameters, also for non-standard applications	P7S_UW_A_Inz_0 1, P7S_UW_A
MMDA2A_U02	Student is able to utilize acquired knowledge to solve economic problems in the industry of non-ferrous metals by using structural, functional, noble and composite materials based on non-ferrous metals and alloys	P7S_UW_A, P7S_UW_A_Inz_0 2
MMDA2A_U03	Student has an ability to work in national and international research teams, prove at least B2+ level English proficiency as defined by Common European Framework of Reference for Languages, and shows an ability to use technical English	P7S_UK_A
MMDA2A_U04	Student is able to exploit specialized sources of scientific information, has the ability to use the acquired knowledge and information, including advanced information and communication techniques to solve complex material problems in strategic sectors of the economy using non-ferrous metals	P7S_UW_A
MMDA2A_U05	Student has an ability to organize individual and teamwork plan and is able to cooperate within national and international teams, and shows ability for management functions requiring raising professional qualifications of team members	P7S_UO_A

KEU symbol	Learning outcomes prescribed to a field of study	CEU symbol
MMDA2A_U06	Student has an ability to independently plan, implement and improve their own qualifications and competencies	P7S_UU_A

Social competence

KEU symbol	Learning outcomes prescribed to a field of study	CEU symbol
MMDA2A_K01	Student is ready to make a critical self-assessment of the acquired knowledge, can assess the value of gathered information in solving cognitive and practical problems and consult experts in matters requiring professional advice	P7S_KK_A
MMDA2A_K02	Student is ready to think and act in an enterprising and creative manner, initiate activities for the benefit of the economy and the social environment, and demonstrate care for the natural environment	P7S_KO_A
MMDA2A_K03	Student is ready to follow the rules of professional conducts, support and share the traditions of the AGH University of Science and Technology and the Faculty of Non-Ferrous Metals in Poland and around the world	P7S_KR_A

Compliance table of engineering competence (Inz) with directional learning outcomes (KEU)

Major : Modern Materials Design and Application

Knowledge

CEU symbol	Learning outcomes for qualifications including engineering competence	KEU references
P7S_WG_A_Inz	knowledge of basic processes taking place in the life cycle of technical devices, facilities and systems	MMDA2A_W03, MMDA2A_W05
P7S_WK_A_Inz	knowledge of basic principles of creating and developing various forms of individual entrepreneurship	MMDA2A_W08

Skills

CEU symbol	Learning outcomes for qualifications including engineering competence	KEU references
P7S_UW_A_Inz_01	ability to plan and carry out experiments, including measurements and computer simulations as well as to interpret the obtained results and draw conclusions out of them. When identifying and formulating the specification of engineering problems and solving them, being able to: - use analytical, simulation and experimental methods; - recognize their systemic and non-technical aspects, including ethical connotations; - conduct a preliminary economic assessment of the proposed solutions and planned engineering activities; - perform a critical analysis of the functioning of existing technical solutions to further evaluate them;	MMDA2A_U01
P7S_UW_A_Inz_02	ability to design solutions in compliance with the given specification as well as being able to: create simple devices, facilities and systems typical for the study major or implement processes using skillfully chosen methods, techniques, tools and materials	MMDA2A_U02

Field of study-prescribed outcomes coverage matrix

Field of study: Modern Materials Design and Application

2023/2024/S/III/MN/MMDA/all

Course	Code	Semestr	MMDA2A_W01	MMDA2A_W02	MMDA2A_W03	MMDA2A_W04	MMDA2A_W05	MMDA2A_W06	MMDA2A_W07	MMDA2A_W08	MMDA2A_U01	MMDA2A_U02	MMDA2A_U03	MMDA2A_U04	MMDA2A_U05	MMDA2A_U06	MMDA2A_K01	MMDA2A_K02	MMDA2A_K03
Chemistry for materials science	NMMDAS.IIi1K.8834febb9ffca41c7c52f8795803d3a5.23	1	x		x	x	x				x		x		x		x		
Physicochemistry of nano-structural surface layers	NMMDAS.IIi1K.23885279179e05a3f61efc64f5ee877f.23	1	x	x	x	x	x	x	x	x			x	x	x				
Innovative sintered materials and composites	NMMDAS.IIi1K.50d28239d0b85a8354b14437d2987708.23	1	x	x	x	x	x	x			x		x	x	x			x	x
Texture development in metals	NMMDAS.IIi1K.f2d289a003dfd6782f842be1a3a04cb3.23	1	x			x		x	x		x		x	x	x	x			
Automation of experiments and analysis of results in materials science	NMMDAS.IIi1K.1de777f67582e2c53e44423b2f0a1c64.23	1				x			x		x					x			
Product Quality Management	NMMDAS.IIi1K.81aa967d54b8cb437b9d188e70f9ace5.23	1					x			x		x		x	x	x	x	x	x
Advances in non-ferrous metals science	NMMDAS.IIi1K.620a055dc136a.23	1	x	x	x	x	x				x	x					x	x	
Fundamentals on non-ferrous metals engineering	NMMDAS.IIi1K.5b164bb11d43d515e1d2917df3ad7f4f.23	1	x	x							x						x		
Light metals and alloys	NMMDAS.IIi2K.9dddde05634c903f0a6b881980cd30af6.23	2	x	x	x	x					x	x		x					
Welding and joining processes	NMMDAS.IIi2K.9a217de0c7c95f4f45c98bfd005f267b.23	2				x	x								x	x			
Technical Foreign Language B2+	NMMDAS.IIi2JO.620a056582682.23	2											x						
Materials and technologies in the automotive and aviation industry	NMMDAS.IIi2K.620a0563c5e12.23	2	x	x	x		x				x	x		x	x	x	x	x	x

Course	Code	Semestr	MMDA2A_W01	MMDA2A_W02	MMDA2A_W03	MMDA2A_W04	MMDA2A_W05	MMDA2A_W06	MMDA2A_W07	MMDA2A_W08	MMDA2A_U01	MMDA2A_U02	MMDA2A_U03	MMDA2A_U04	MMDA2A_U05	MMDA2A_U06	MMDA2A_K01	MMDA2A_K02	MMDA2A_K03
Technologies in the cable industry	NMMDAS.IIi2K.620a05645fda3.23	2		x	x	x	x			x			x	x	x	x	x	x	x
Materials for medical applications	NMMDAS.IIi2K.1dd9bfa0a93fef6de7115f8eb3ed2ab7.23	2	x		x					x	x	x					x		
High pressures in material technologies	NMMDAS.IIi2K.620f851330a73.23	2	x		x	x					x		x		x		x		
Modern methods for the separation and purification of metals	NMMDAS.IIi2K.620a05627893f.23	2		x	x				x		x	x		x			x	x	
Modern processing of non-ferrous metals	NMMDAS.IIi2K.ce2862e82f2837233124e053527ffbd.a.23	2	x	x	x	x	x				x	x	x	x	x		x	x	x
Modern techniques for metal analysis	NMMDAS.IIi2K.1012e5ec9d928974d2417ac8fb882c29.23	2	x			x		x	x		x		x	x	x	x			
Nanomaterials	NMMDAS.IIi4K.d57ba9a242ee4351ff630ce351e5124c.23	3	x		x	x	x				x								
Diploma Thesis	NMMDAS.IIi4K.e53bc1ffec52171870fc55d1cec2fa6a.23	3	x		x	x				x	x	x		x			x	x	
Modern surface engineering	NMMDAS.IIi4K.4b8a9c618a33055964780a29bcbcae3a.23	3	x	x	x		x		x		x	x				x	x	x	
Modeling of structure and strength evolution during plastic deformation of metals	NMMDAS.IIi4K.1afb7c10b53464ea81b5ea6fad179ff.23	3	x	x	x	x	x		x		x	x		x	x	x	x	x	x
Materials inspired by nature	NMMDAS.IIi4K.5f96abfdf266c.23	3	x	x	x	x					x		x	x	x	x	x	x	
Diploma Seminar	NMMDAS.IIi4K.113e607328fe3b1feac36d5c37a13bcd.23	3	x	x	x	x				x			x	x	x	x	x	x	
Micromechanics of composite materials	NMMDAS.IIi4K.5f96a3db385ed.23	3	x	x	x				x		x	x		x		x	x	x	
Sum (obligatory):			9	7	8	8	4	2	2	3	9	6	5	8	6	3	8	7	3
Sum (elective):			10	7	10	9	8	2	6	3	10	5	4	8	7	11	7	7	3

Course	Code	Semestr	MMDA2A_W01	MMDA2A_W02	MMDA2A_W03	MMDA2A_W04	MMDA2A_W05	MMDA2A_W06	MMDA2A_W07	MMDA2A_W08	MMDA2A_U01	MMDA2A_U02	MMDA2A_U03	MMDA2A_U04	MMDA2A_U05	MMDA2A_U06	MMDA2A_K01	MMDA2A_K02	MMDA2A_K03
Sum:			19	14	18	17	12	4	8	6	19	11	9	16	13	14	15	14	6

Characteristics matrix of learning outcomes in relation to modules

Major: Modern Materials Design and Application

2023/2024/S/III/MN/MMDA/all

Course	Code	Semestr	P7S_WG_A	P7S_WG_A_Inz	P7S_WK_A	P7S_WK_A_Inz	P7S_UW_A_Inz_01	P7S_UW_A	P7S_UW_A_Inz_02	P7S_UK_A	P7S_UO_A	P7S_UU_A	P7S_KK_A	P7S_KO_A	P7S_KR_A
Chemistry for materials science	NMMDAS.IIi1K.8834febb9ffca41c7c52f8795803d3a5.23	1	x	x			x	x				x		x	
Physicochemistry of nano-structural surface layers	NMMDAS.IIi1K.23885279179e05a3f61efc64f5ee877f.23	1	x	x	x	x		x			x	x			
Innovative sintered materials and composites	NMMDAS.IIi1K.50d28239d0b85a8354b14437d2987708.23	1	x	x			x	x		x	x			x	x
Texture development in metals	NMMDAS.IIi1K.f2d289a003dfd6782f842be1a3a04cb3.23	1	x				x	x		x	x	x			
Automation of experiments and analysis of results in materials science	NMMDAS.IIi1K.1de777f67582e2c53e44423b2f0a1c64.23	1	x				x	x				x			
Product Quality Management	NMMDAS.IIi1K.81aa967d54b8cb437b9d188e70f9ace5.23	1	x	x	x	x		x	x		x	x	x	x	x
Advances in non-ferrous metals science	NMMDAS.IIi1K.620a055dc136a.23	1	x	x			x	x	x				x	x	
Fundamentals on non-ferrous metals engineering	NMMDAS.IIi1K.5b164bb11d43d515e1d2917df3ad7f4f.23	1	x				x	x					x		
Light metals and alloys	NMMDAS.IIi2K.9ddde05634c903f0a6b881980cd30af6.23	2	x	x			x	x	x						
Welding and joining processes	NMMDAS.IIi2K.9a217de0c7c95f4f45c98bfd005f267b.23	2	x	x							x	x			
Technical Foreign Language B2+	NMMDAS.IIi2JO.620a056582682.23	2								x					
Materials and technologies in the automotive and aviation industry	NMMDAS.IIi2K.620a0563c5e12.23	2	x	x			x	x	x		x	x	x	x	x
Technologies in the cable industry	NMMDAS.IIi2K.620a05645fda3.23	2	x	x	x	x		x		x	x	x	x	x	x

Course	Code	Semestr	P7S_WG_A	P7S_WG_A_Inz	P7S_WK_A	P7S_WK_A_Inz	P7S_UW_A_Inz_01	P7S_UW_A	P7S_UW_A_Inz_02	P7S_UK_A	P7S_UO_A	P7S_UU_A	P7S_KK_A	P7S_KO_A	P7S_KR_A
Materials for medical applications	NMMDAS.IIi2K.1dd9bfa0a93fef6de7115f8eb3ed2ab7.23	2	x	x	x	x	x	x	x				x		
High pressures in material technologies	NMMDAS.IIi2K.620f851330a73.23	2	x	x			x	x		x	x		x		
Modern methods for the separation and purification of metals	NMMDAS.IIi2K.620a05627893f.23	2	x	x			x	x	x				x	x	
Modern processing of non-ferrous metals	NMMDAS.IIi2K.ce2862e82f2837233124e053527ffbda.23	2	x	x			x	x	x	x	x		x	x	x
Modern techniques for metal analysis	NMMDAS.IIi2K.1012e5ec9d928974d2417ac8fb882c29.23	2	x				x	x		x	x	x			
Nanomaterials	NMMDAS.IIi4K.d57ba9a242ee4351ff630ce351e5124c.23	3	x	x			x	x							
Diploma Thesis	NMMDAS.IIi4K.e53bc1ffec52171870fc55d1cec2fa6a.23	3	x	x	x	x	x	x	x				x	x	
Modern surface engineering	NMMDAS.IIi4K.4b8a9c618a33055964780a29bcbcae3a.23	3	x	x			x	x	x			x	x	x	
Modeling of structure and strength evolution during plastic deformation of metals	NMMDAS.IIi4K.1afbb7c10b53464ea81b5ea6fad179ff.23	3	x	x			x	x	x		x	x	x	x	x
Materials inspired by nature	NMMDAS.IIi4K.5f96abfdf266c.23	3	x	x			x	x		x	x	x	x	x	
Diploma Seminar	NMMDAS.IIi4K.113e607328fe3b1feac36d5c37a13bcd.23	3	x	x	x	x		x		x	x	x	x	x	
Micromechanics of composite materials	NMMDAS.IIi4K.5f96a3db385ed.23	3	x	x			x	x	x			x	x	x	
Sum (obligatory):			11	9	3	3	9	11	6	5	6	3	8	7	3
Sum (elective):			13	11	3	3	10	12	5	4	7	11	7	7	3
Sum:			24	20	6	6	19	23	11	9	13	14	15	14	6

Matrix of learning outcomes prescribed to a field of study with related forms of classes and the method of testing

Major: Modern Materials Design and Application

2023/2024/S/III/MN/MMDA/all

Name of the module	Activity	Method of verification and assessment of learning outcomes achieved by the student in individual forms of classes and activities for the entire module	KEU references
Chemistry for materials science	Lectures, Project classes	Test results, Activity during classes, Participation in a discussion, Execution of a project, Involvement in teamwork, Presentation	MMDA2A_W01, MMDA2A_W03, MMDA2A_W04, MMDA2A_W05, MMDA2A_U04, MMDA2A_U01, MMDA2A_U06, MMDA2A_K02
Physicochemistry of nano-structural surface layers	Lectures, Project classes	Test, Presentation, Oral answer, Project, Presentation	MMDA2A_W01, MMDA2A_W02, MMDA2A_W03, MMDA2A_W06, MMDA2A_W07, MMDA2A_W08, MMDA2A_W04, MMDA2A_W05, MMDA2A_U04, MMDA2A_U05, MMDA2A_U06
Innovative sintered materials and composites	Lectures, Laboratory classes, Seminars	Activity during classes, Examination, Test, Report, Oral answer, Participation in a discussion, Presentation	MMDA2A_W01, MMDA2A_W02, MMDA2A_W03, MMDA2A_W04, MMDA2A_W06, MMDA2A_W05, MMDA2A_U01, MMDA2A_U03, MMDA2A_U04, MMDA2A_U05, MMDA2A_K02, MMDA2A_K03
Texture development in metals	Lectures, Laboratory classes	Test, Execution of laboratory classes, Report, Completion of laboratory classes	MMDA2A_W01, MMDA2A_W04, MMDA2A_W06, MMDA2A_W07, MMDA2A_U01, MMDA2A_U03, MMDA2A_U04, MMDA2A_U05, MMDA2A_U06
Automation of experiments and analysis of results in materials science	Lectures, Project classes	Participation in a discussion, Test, Project, Involvement in teamwork, Test results, Activity during classes, Test, Project, Scientific paper, Involvement in teamwork, Test results, Presentation	MMDA2A_W04, MMDA2A_W07, MMDA2A_U01, MMDA2A_U06
Product Quality Management	Lectures, Project classes	Activity during classes, Participation in a discussion, Examination, Activity during classes, Execution of a project, Involvement in teamwork	MMDA2A_W05, MMDA2A_W08, MMDA2A_U02, MMDA2A_U04, MMDA2A_U05, MMDA2A_U06, MMDA2A_K01, MMDA2A_K02, MMDA2A_K03
Advances in non-ferrous metals science	Lectures, Seminars, Discussion seminars	Examination, Participation in a discussion, Presentation, Project, Involvement in teamwork	MMDA2A_W01, MMDA2A_W02, MMDA2A_W03, MMDA2A_W04, MMDA2A_W05, MMDA2A_U01, MMDA2A_U02, MMDA2A_K01, MMDA2A_K02

Name of the module	Activity	Method of verification and assessment of learning outcomes achieved by the student in individual forms of classes and activities for the entire module	KEU references
Fundamentals on non-ferrous metals engineering	Lectures, Laboratory classes, Project classes	Examination, Execution of laboratory classes, Test, Report, Involvement in teamwork, Participation in a discussion, Scientific paper, Presentation	MMDA2A_W01, MMDA2A_W02, MMDA2A_U01, MMDA2A_K01
Light metals and alloys	Lectures, Laboratory classes, Seminars	Activity during classes, Participation in a discussion, Examination, Activity during classes, Participation in a discussion, Execution of laboratory classes, Report, Completion of laboratory classes, Activity during classes, Project, Presentation	MMDA2A_W01, MMDA2A_W04, MMDA2A_W02, MMDA2A_W03, MMDA2A_U01, MMDA2A_U02, MMDA2A_U04
Welding and joining processes	Lectures, Laboratory classes, Project classes	Test, Test, Scientific paper, Essay	MMDA2A_W04, MMDA2A_W05, MMDA2A_U05, MMDA2A_U06
Technical Foreign Language B2+	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Report, Scientific paper, Test results, Essays written during classes, Presentation	MMDA2A_U03
Materials and technologies in the automotive and aviation industry	Lectures, Project classes, Discussion seminars	Participation in a discussion, Test, Execution of a project, Participation in a discussion, Essay	MMDA2A_W01, MMDA2A_W03, MMDA2A_W02, MMDA2A_W05, MMDA2A_U01, MMDA2A_U02, MMDA2A_U04, MMDA2A_U05, MMDA2A_U06, MMDA2A_K01, MMDA2A_K02, MMDA2A_K03
Technologies in the cable industry	Lectures, Project classes	Test results, Execution of a project	MMDA2A_W02, MMDA2A_W04, MMDA2A_W08, MMDA2A_W03, MMDA2A_W05, MMDA2A_U04, MMDA2A_U05, MMDA2A_U06, MMDA2A_U03, MMDA2A_K01, MMDA2A_K02, MMDA2A_K03
Materials for medical applications	Lectures, Seminars, Discussion seminars	Participation in a discussion, Test, Scientific paper, Presentation, Participation in a discussion, Essay	MMDA2A_W01, MMDA2A_W03, MMDA2A_W08, MMDA2A_U01, MMDA2A_U02, MMDA2A_K01
High pressures in material technologies	Lectures, Seminars	Test, Examination, Participation in a discussion, Project, Report, Presentation	MMDA2A_W01, MMDA2A_W03, MMDA2A_W04, MMDA2A_U01, MMDA2A_U03, MMDA2A_U05, MMDA2A_K01
Modern methods for the separation and purification of metals	Lectures, Project classes, Laboratory classes	Examination, Execution of a project, Execution of laboratory classes, Test	MMDA2A_W02, MMDA2A_W03, MMDA2A_W07, MMDA2A_U01, MMDA2A_U02, MMDA2A_U04, MMDA2A_K01, MMDA2A_K02

Name of the module	Activity	Method of verification and assessment of learning outcomes achieved by the student in individual forms of classes and activities for the entire module	KEU references
Modern processing of non-ferrous metals	Lectures, Laboratory classes, Project classes	Examination, Test, Project	MMDA2A_W01, MMDA2A_W04, MMDA2A_W05, MMDA2A_W02, MMDA2A_W03, MMDA2A_U01, MMDA2A_U02, MMDA2A_U03, MMDA2A_U04, MMDA2A_U05, MMDA2A_K02, MMDA2A_K03, MMDA2A_K01
Modern techniques for metal analysis	Lectures, Laboratory classes, Project classes	Test, Activity during classes, Completion of laboratory classes, Activity during classes	MMDA2A_W01, MMDA2A_W04, MMDA2A_W06, MMDA2A_W07, MMDA2A_U01, MMDA2A_U03, MMDA2A_U04, MMDA2A_U05, MMDA2A_U06
Nanomaterials	Lectures, Seminars, Discussion seminars	Participation in a discussion, Test, Scientific paper, Presentation, Participation in a discussion, Essay	MMDA2A_W01, MMDA2A_W03, MMDA2A_W05, MMDA2A_W04, MMDA2A_U01
Diploma Thesis	Diploma Thesis	Diploma thesis, Diploma thesis preparation	MMDA2A_W01, MMDA2A_W03, MMDA2A_W08, MMDA2A_W04, MMDA2A_U02, MMDA2A_U04, MMDA2A_U01, MMDA2A_K01, MMDA2A_K02
Modern surface engineering	Lectures, Laboratory classes, Project classes	Activity during classes, Execution of laboratory classes, Test, Report, Completion of laboratory classes, Participation in a discussion, Project, Presentation	MMDA2A_W01, MMDA2A_W02, MMDA2A_W03, MMDA2A_W05, MMDA2A_W07, MMDA2A_U01, MMDA2A_U02, MMDA2A_U06, MMDA2A_K01, MMDA2A_K02
Modeling of structure and strength evolution during plastic deformation of metals	Lectures, Laboratory classes, Project classes	Test, Test, Execution of a project	MMDA2A_W01, MMDA2A_W04, MMDA2A_W07, MMDA2A_W02, MMDA2A_W03, MMDA2A_W05, MMDA2A_U01, MMDA2A_U02, MMDA2A_U04, MMDA2A_U05, MMDA2A_U06, MMDA2A_K01, MMDA2A_K02, MMDA2A_K03
Materials inspired by nature	Lectures, Project classes, Discussion seminars	Test results, Activity during classes, Participation in a discussion, Execution of a project, Involvement in teamwork, Presentation, Activity during classes, Case study, Involvement in teamwork	MMDA2A_W01, MMDA2A_W02, MMDA2A_W03, MMDA2A_W04, MMDA2A_U01, MMDA2A_U03, MMDA2A_U04, MMDA2A_U05, MMDA2A_U06, MMDA2A_K01, MMDA2A_K02
Diploma Seminar	Seminars	Presentation	MMDA2A_W08, MMDA2A_W01, MMDA2A_W02, MMDA2A_W03, MMDA2A_W04, MMDA2A_U03, MMDA2A_U05, MMDA2A_U06, MMDA2A_U04, MMDA2A_K01, MMDA2A_K02
Micromechanics of composite materials	Lectures, Seminars, Discussion seminars	Test, Presentation, Execution of a project	MMDA2A_W02, MMDA2A_W01, MMDA2A_W03, MMDA2A_W07, MMDA2A_U01, MMDA2A_U02, MMDA2A_U04, MMDA2A_U06, MMDA2A_K01, MMDA2A_K02

ECTS credits calculations

Field of study: Modern Materials Design and Application

The total number of ECTS credits the student needs to obtain in the form of:

classes conducted with the direct participation of academic teachers or other persons conducting classes	48
core science classes relevant to a given major	0
practical classes, developing practical skills, including laboratory, design, practical and workshop classes	40
classes subject to choice by the student (in the amount of not less than 30% of the number of ECTS credits necessary to obtain qualifications corresponding to the level of education)	47
classes in the field of humanities or social sciences - in the case of fields of study assigned to disciplines within fields other than humanities or social sciences, respectively	5
foreign language classes	2
practical placements	0
classes related to the academic activity conducted at the University in the discipline or disciplines to which the field of study is assigned, in the amount greater than 50% of the number of ECTS credits required to complete studies at a given level, taking into account the participation of students in classes preparing to conduct scientific activity or participate in this activity (applies only to studies with a general academic profile)	78
classes shaping practical skills in the amount greater than 50% of the number of ECTS credits required to complete studies at a given level (applies only to studies with a practical profile)	not applicable

Detailed rules of the implementation of the curriculum established by the Dean of the Faculty (the so-called Study Rules)

Field of study: Modern Materials Design and Application

Enrollment rules for the next semester

Detailed rules for the next semester enrollment are specified in AGH University of Science and Technology Study Regulations.

Enrollment rules for the next semester as a part of the so-called ECTS credits debt ceiling

Detailed rules for the next semester registration are specified in AGH University of Science and Technology Study Regulations. Completion of the semester of studies and confirmation of registration for the next semester of studies shall be take place in the University's computer system no later than one week from the beginning of the next semester. Confirmation of registration for the next semester of studies shall also take place in the student's periodical achievements card. Students may register for the next semester if their total ECTS point deficit does not exceed 10 ECTS. A student shall apply in this matter to the Dean of the Faculty.

ECTS credits debt ceiling

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Organization of classes within the so-called blocks of classes (i.e. such organization of subjects or individual forms of classes that creates exceptions to the cyclical nature of classes in particular weeks of a given semester of studies)

Not applicable

Monitoring semesters

None

Study rules in case of the individual organization of studies approved for a specific student

A student may study in an individual organisation with the approval of the Dean. In particular, persons fulfilling the requirements specified in the AGH Study Regulations (§ 2, 3 and 3a) may apply for an IOS. In other individual situations of students not mentioned in the regulations, each time a decision on the application for an IOS is made by the Dean. In each case, the approval of the supervisor is required. The individual study arrangement is determined by the student in agreement with the research and teaching supervisor. The student submits an application to the Dean of the Faculty, together with a justification, immediately after the occurrence of the reason constituting the basis for granting the IOS. Studying in accordance with an IOS may not lead to a change in the directional learning achievements and course modules deemed obligatory in the study programme for a given field of study, level, and profile, nor may it lead to an extension of the time limit for completion of the studies.

The individualisation of the organisation of studies may consist, in particular, in:

- individual selection of course modules, methods, and forms of study;
- modification of the form of final course tests and examinations;
- modification of the number of ECTS credits required to complete a semester of study;
- the modification of the weekly schedule of classes, as far as possible, through the selection of the class group and/or the hours of classes in such a way as to enable the student to complete the existing study programme in line with his or her time capabilities;
- changes to the dates of examinations and final course tests in agreement with the subject or course leader.

Implementation of practical placements including monitoring system and completion rules

Not applicable

Rules of elective modules taking

The student shall choose modules of classes from a base of elective subjects common to the entire field of study. The study program includes four content-related areas of elective subjects including: (I) characterization of materials and process automation, (II) Materials and processing innovations and (III) Advanced functional materials. Foreign language and H-S course modules are also available as elective subjects. Depending on the semester, the student chooses subjects from a given block for a specified number of ECTS credits.

Rules of education paths, graduation paths, major choice/eligibility

Not applicable

Rules related to the preparation of diploma projects and theses as well as the implementation of the degree granting

The diploma thesis may consist in particular of a written work, a published article, a design work including an engineering design, the execution of a computer programme or system, and a construction, technological, or artistic work. The topics of the diploma thesis should be taken up by students no later than one year before the planned date of graduation. Failure to meet this condition may be a reason for refusing admission to the semester preceding the graduation semester.

Dissertation topics are proposed directly by the authorised academic supervisors or commissioned by the workplaces concerned. The topic of the diploma thesis may also be proposed by the student in agreement with the potential supervisor.

The submission of thesis topics is made electronically via the USOS system - APD module by the thesis supervisor. A student interested in writing a thesis with a particular supervisor contacts the supervisor to determine the topic of the thesis. The topic of the thesis may also be selected from a list proposed by the staff of the Faculty of Non-Ferrous Metals, which can be viewed in the USOS - APD module. Once a topic is selected from the list, the employee who proposed the topic should be contacted.

Electronic thesis topic proposals submitted by supervisors are approved in the USOS - APD module by the appropriate Committee. A change to the topic of the diploma thesis is possible through an electronic message sent by the thesis supervisor to the Dean's Office e-mail address and is approved by the Dean.

The diploma thesis may be prepared under the supervision of a thesis supervisor who is an academic teacher with at least a habilitation degree. In justified cases, the Dean of the Faculty may give permission for the thesis to be prepared under the direction of an academic teacher holding a Ph.D. degree or under the direction of another person holding a Ph.D. degree who is competent and experienced enough to properly complete the thesis.

The thesis supervisor determines the mode and timetable of the thesis to enable its timely completion. The thesis supervisor is also obliged to verify the written thesis using the JSA.

The thesis reviewer may be an academic teacher with a degree of at least Ph.D., as well as an expert in a given field after obtaining the consent of the Dean of the Faculty. The thesis reviewer is proposed by the thesis supervisor; his/her choice should be dictated by substantive considerations. The dissertation supervisor reports his/her proposal of a reviewer in the USOS system - APD module during the graduation process, i.e. at the stage when the student registers the diploma thesis in the system. The proposal is approved by Dean.

Conditions for the completion of the diploma thesis

- The diploma thesis shall be carried out individually.
- The diploma thesis may be a team work, provided that the participation of each of its performers is specified in detail.

- The size of the group that performs the team work should not exceed two persons.

The thesis shall be considered to have been submitted on time when the following conditions are met together:

- having passed all the course modules provided for in the programme of study;
- after the student enters the final version of the diploma thesis into the USOS system in electronic form only;
- after verification of diploma thesis in electronic form using JSA;
- after the thesis review is entered by the thesis supervisor and reviewer in the USOS system;
- after the thesis supervisor and reviewer entered a positive grade in the USOS system.

The student is obliged to submit the diploma thesis electronically through the USOS system no later than the end of September - in the case of studies that end in the summer semester (§ 25, para. 15, pt. 1, AGH Study Regulations). Only positive opinions and grades given by both the thesis supervisor and the reviewer complete the thesis registration process in the USOS system. Hence the necessity for the student to upload the file with the electronic version of the thesis to the system sufficiently in advance to enable both the thesis supervisor and the The dissertation supervisor and reviewer must give a positive opinion and grade before the deadline for its registration, i.e., the last day of the month of September.

Diploma Examination - Master's degree

The Master's degreediploma examination is held at the end of October for studies ending in the summer semester. Planned examination dates are announced on the Faculty website well in advance.

A student is admitted to the examination if:

- has passed all the course modules provided for in the programme of study for the course,
- has submitted the diploma thesis on time with positive opinions of the supervisor and reviewer.

The Master's diploma examination is conducted by a Commission appointed by the Dean of the Faculty. A separate Diploma Examination Commission is appointed for each course of study.

The Course of the Diploma Examination (thesis defence):

- thesis presentation,
- Presentation of thesis evaluations (reviews),
- discussion of the thesis - questions from members of the examination commission,
- Verification of the level of mastery of knowledge and skills in the field of the studied major - questions from members of the examination commission.

Principles for determining the overall evaluation of graduation (the final grade)

The final result (FG), entered into the diploma and the supplement, is established as a weighted average of the following ratings: $FG = 0.6 \cdot A + 0.2 \cdot T + 0.2 \cdot E$, where: A is the average grade of the whole degree programme; T is the final grade of the diploma thesis; E is the diploma examination grade (A, T, and E grades must be positive). The graduate who fulfils all the following requirements: who has submitted the diploma thesis and passed the diploma examination in due time, who has been granted with an average grade from the studies higher than 4,72, and who has very good grades for the diploma thesis and for the diploma examination, may be awarded a distinction by the Examination Commission or Dean. Graduates awarded the distinction shall receive a diploma with distinction.

Other requirements related to the implementation of the curriculum resulting from the AGH University Study Regulations or other regulations in force at the University

None