„ALEXANDRU IOAN CUZA”

UNIVERSITY OF IAŞI

FACULTY OF CHEMISTRY

ECTS STUDY GUIDE

Academic year

2009-2010

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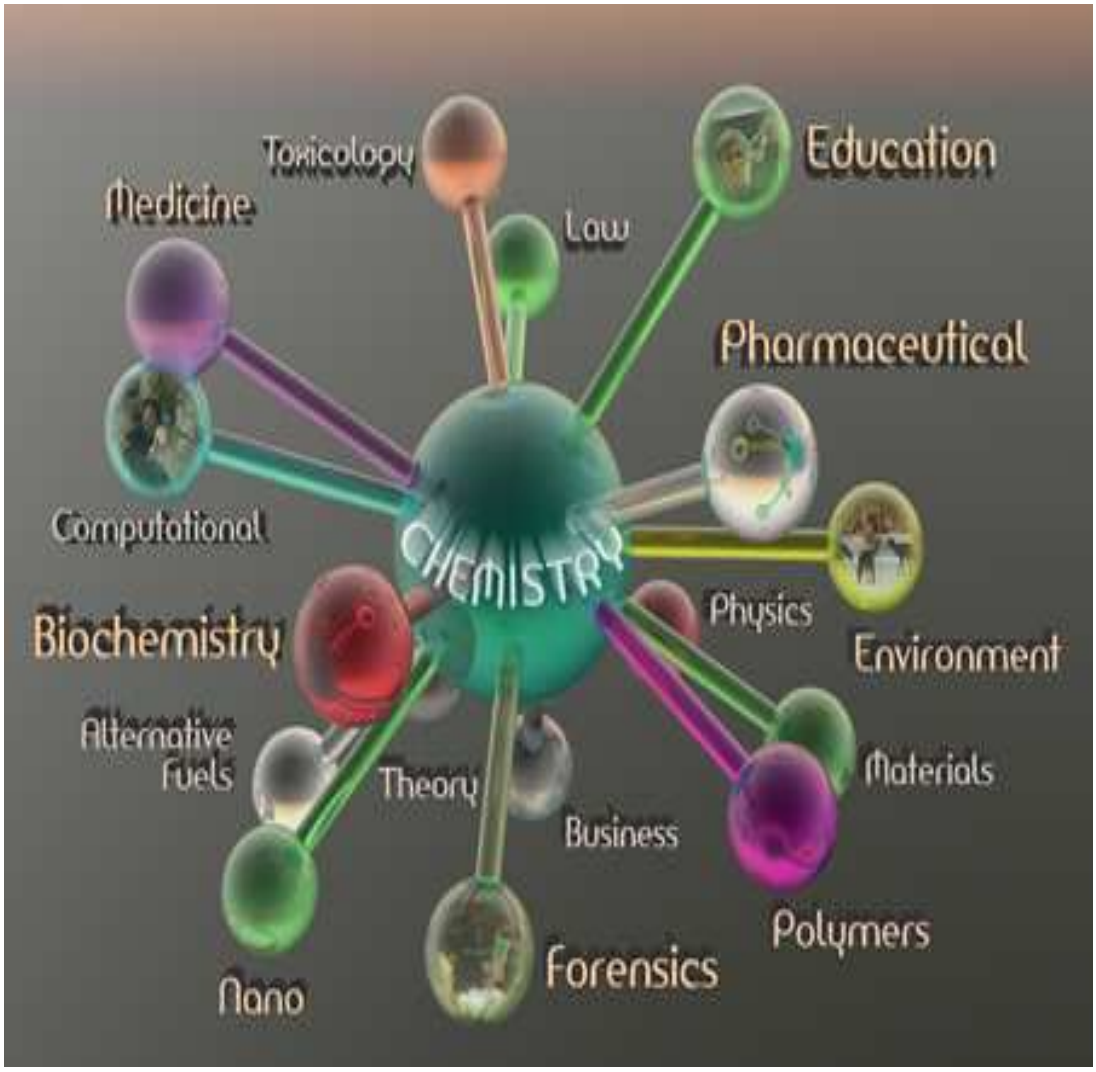
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I. INFORMATION ON THE FACULTY OF CHEMISTRY

I. a. ADDRESS:

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I. b. GENERAL DESCRIPTION

The Alexandru Ioan Cuza University of Iasi is the oldest higher education institution in Romania. Since 1860, the university has been carrying on a tradition of excellence and innovation in the fields of education and research. With over 38.000 students and 800 academic staff, the university enjoys a high prestige at national and international level and cooperates with over 250 universities worldwide. The Alexandru Ioan Cuza University became the first student-centered university in Romania, once the Bologna Process was put into practice. Research at our university is top level. For the second year in a row, the University is placed first in the national research ranking. Striving for excellence, the university takes unique initiatives to stimulate research quality, to encourage dynamic and creative education and to attract the best students to academic life.

Faculty of Chemistry is one of 15 faculties from the „Alexandru Ioan Cuza" University of Iaşi, and has the status of accredited public state faculty.

I. c. HISTORY OF FACULTY

Chemistry, as a teaching discipline, was included even in the first curriculum of the "Al.I. Cuza" University of Iaşi, inaugurated on October 26, 1860, where the chemistry teaching was continued and developed, on a higher level, in different organizational forms.

The curriculum elaborated in 1860 had inorganic and organic chemistry as a single teaching discipline for the second and the third years of study within the Faculty of Philosophy till the Education Law promulgated on November 25, 1864. By this law, section of positive sciences within the Faculty of Philosophy was transferred within the Faculty of Sciences, with 12 departments. The departments of physics and chemistry became a single one and its first full professor was Stefan Micle. In 1876, within the Faculty of Sciences were created three sections: Mathematical, Physical and Natural Sciences, stated also by the School regulations in 1880. The second section, i.e., Physical section, had two courses: one of physics and another of chemistry. This section was divided, in 1878, in the Department of Physics and the Department of Chemistry, under direction of the full professors Ştefan Micle and Petru Poni, respectively. After the division, in 1878, Petru Poni assumed the task of organizing and popularizing the study of chemistry. His contributions in the field of petroleum research brought to light his conception regarding the applied character of science, in close connection with the development of society. So, the year 1878 may be considered the starting point of an independent chemical teaching and the famous Romanian scientist Petru Poni can be nominated as father of this teaching in Romania. He created an active school whose collaborators and students have continued with the same abnegation, the activity of their master.

We should remember here Anastasie Obreja, another pioneer of Romanian chemistry and chair of the Department of Organic Chemistry after 1892, Petru Bogdan, the chair of the first physical chemistry department and Radu Cernatescu, the first professor of analytical chemistry of the University of Iaşi.

A new law, that of 1898, whose initiator was Spiru Haret gave higher education a more solid basis through the more rigorous specialisation of high-school disciplines. Until the application of the new legislation stipulations, and especially after this date, the sections of the Faculty of Sciences within the University, knew a many-sided and continuous development. So, for example, the Department of General Chemistry, within the section of physics was divided, in 1892, into the Department of Organic Chemistry and the Department of Inorganic Chemistry.

In the 1895-1896 academic year, among the 13 departments within the Faculty of Sciences were also the departments of inorganic chemistry and organic chemistry.

The School regulations in 1900, confirming the ascendent development of chemistry teaching, transformed the section of physical sciences into the section of physicochemical sciences. In 1906, besides the two departments of inorganic chemistry and organic chemistry of the section, a department of agricultural chemistry was added within the section of the natural sciences, as well as a free course of physical chemistry. In 1913 was inaugurated the Department of Physical and Analytical Chemistry under direction of the illustrious Romanian scientist, professor Petru Bogdan. In 1921, physical chemistry obtained an independent status, becoming the first department of this kind in our country.

By foundation of the three departments, i.e., Inorganic Chemistry, Organic Chemistry and Physical Chemistry, the structure of one Faculty of Chemistry was accomplished, according to the European meaning of that time. These departments worked within the Faculty of Sciences of the University until 1948, when the Faculty of Chemistry was created as an independent one. The three departments mentioned above with the another three, i.e., Analytical Chemistry, General Chemistry and Chemical Technology and Catalysis made up the Faculty of Chemistry till 1974 when it was transferred within the Faculty of Chemical Technology at the Polytechnic Institute of Iaşi, where worked until 1990. In the 1990-1991 academic year, the Faculty of Chemistry came again within the "Al.I. Cuza" University.

I. d. ORGANIZATION AND STRUCTURE OF THE FACULTY

The faculty's programmes are administered through six collectives:

- Analytical Chemistry;
- Inorganic Chemistry;
- Biochemistry;
- Physical and Theoretical Chemistry;
- Materials Chemistry;
- Organic Chemistry.

The entire activity of the faculty is directed by:

Dean:

Assoc. prof. Ph.D. Dumitru Gânju, dganju@uaic.ro, phone: +40-232-201289;

Chancelor:

Assoc. prof. Ph.D. Adrian Bîrzu, abirzu@uaic.ro, phone: +40-232-201344;

Director of the Didactic Department:

Assoc. prof. Ph.D. Mihail-Lucian Bîrsă, lbirsa@uaic.ro, phone: +40-232-201349;

Director of the Research Department:

Prof. Ph. D. Eveline Popovici, eveline@uaic.ro, phone: +40-232-201135

Administrator in chief:

Mr. Vasile Vatră, vvatra@uaic.ro, phone: +40-232-202363.

The inputs and outputs registration and other secretary office activities of the faculty are performed by:

Secretary in chief:

Mrs. Angela Vatră, avatra@uaic.ro, phone: +40-232-201063;

Secretary:

Mrs. Gabriela Pavelescu, pgabi@uaic.ro, phone: +40-232-201063;

Analyst programmer:

Mrs. Ionela Fodor, ionela.fodor@uaic.ro, phone: +40-232-201363.

I. e. ACADEMIC CALENDAR

I. e .1. Undergraduate Studies

First Semester

All years:

September 28th, 2009: Opening of the academic year.

September 28th - December 20th, 2009: 12 weeks, Teaching activity.

December 21st, 2009 - January 10th, 2010: 3 weeks, Winter holiday.

January 11th - February 7th, 2010: 4 weeks, Teaching activity and winter examinations.

February 8th - February 21st, 2010: 2 weeks, Holiday.

February 8th - February 21st, 2010: one week, Re-examinations.

February 15th - February 21st, 2010: one week, Graduation examinations.

Second Semester

The first, second years:

February 22nd - June 20th, 2010: 16 weeks, Teaching activity and summer examinations. One week, Easter holiday

June 21st - July 4th, 2010: 2 weeks, Practice of specialty.

July 5th - October 1st, 2010: Summer holiday. In this period, for one week, it can be organised a session for re-examinations.

The third year:

February 22nd - June 20th, 2010: 16 weeks, Teaching activity and summer examinations. One week, Easter holiday.

June 21st - July 4th, 2010: 2 weeks, Graduation work completion. In this period, for one week, it can be organised a session for re-examinations.

July 5th - July 11th, 2010: Graduation examinations.

I. e .2. Graduate Studies

First Semester

All years:

September 28th, 2009: Opening of the academic year.

September 28th - December 20th, 2009: 12 weeks, Teaching activity.

December 21st, 2009 - January 10th, 2010: 3 weeks, Winter holiday.

January 11th - February 7th, 2010: 4 weeks, Teaching activity and winter examinations.

February 8th - February 21st, 2010: 2 weeks, Holiday.

February 8th - February 21st, 2010: one week, Re-examinations.

February 15th - February 21st, 2010: one week, Dissertation examinations.

Second Semester

The first year:

February 22nd - June 20th, 2010: 16 weeks, Teaching activity and summer examinations. One week, Easter holiday

June 21st - July 4th, 2010: 2 weeks, Practice of specialty.

July 5th - October 1st, 2010: Summer holiday. In this period, for one week, it can be organised a session for re-examinations.

The second year:

February 22nd - June 20th, 2010: 16 weeks, Teaching activity and summer examinations. One week, Easter holiday.

June 21st - July 4th, 2010: 2 weeks, Graduation work completion. In this period, for one week, it can be organised a session for re-examinations.

July 5th - July 11th, 2010: Dissertation examinations.

I. f. LIST OF DEGREE PROGRAMMES OFFERED

The faculty has in its structure specialisation sections for undergraduate students and offers a programme of study and research leading to the degrees of Master of Science and Ph. D. in Chemistry as presented below.

I. f. 1. Undergraduate studies in:

- Chemistry (code=CH);
- Technological biochemistry (code=BT)
- Computational Chemistry
- Environmental Chemistry

I. f. 2. Master of Science in:

- Environment chemistry and food safety (code=CMSA);
- Chemistry of cosmetics and pharmaceutical products (code=CPCF);
- Chemistry and biochemistry of heterocycles (code=CBH);
- Applied coordination chemistry (code=CCA);
- Dynamics of chemical systems applied in environmental chemistry (code=DSCACM);
- Didactics of chemistry (code=DCH).

I. f. 3. Ph D program:

Within the Faculty there is organized a Ph. D. programme in the following four specializations:

- Inorganic Chemistry (Prof. Ph.D. Mircea-Nicolae Palamaru, Prof. Ph.D. Aurel Pui);
- Physical Chemistry (Prof. Ph.D. Gelu Bourceanu);
- Organic Chemistry (Prof. Ph.D. Elena Bîcu, Prof. Ph.D. Gabi Drochioiu , Prof. Ph.D. Ionel Mangalagiu);
- Silicon Chemistry and Oxidic Compounds (Prof. Ph.D. Eveline Popovici).

I. g. ADMISSION AND REGISTRATION PROCEDURES

The candidates for admission in university teaching system are secondary school graduates, with a final school-leaving examination diploma, called baccalaureate diploma, or an equivalent diploma, as well as students and graduates from various state higher education institutions.

In the admission examination for a master degree, may participate graduates with a bachelor diploma. The citizens of member states of E.U., European Economic Area and Swiss confederation may candidate for admission in the same conditions as the Romanian citizens, including the quantum of the tuition fees.

The other international students willing to study in Romania can apply either to the Ministry of Education and Research or to the chosen Romanian university, in order to receive the Letter of Acceptance.

The following application papers are requested:

1. Application form;
2. Certified copy of the Baccalaureate Diploma or equivalent - for undergraduate studies;
3. Certified copy of the graduation certificate - for graduate applicants or PhD;
4. Academic record translated into Romanian, English, French or German;
5. Language certificate (see further instructions regarding this issue);
6. Certified copy of the Birth Certificate;
7. Certified copy of the passport;
8. Medical certificate.

The application forms are available at the International Relations Offices of the Ministry of Education and Research or of the Romanian universities, or at the Romanian Embassies abroad. The application papers, only in copy, have to be mailed to the Ministry of Education and Research or to the chosen university, in order to receive the approval statement. The Ministry of Education and Research may issue the Letter of Acceptance in at most 2 months from the date of receiving the complete files. The official documents have to be submitted personally, in original, when applying in Romania.

Before coming to Romania, the international students should have their documents endorsed by the Romanian embassies in their own countries; then, they should obtain a valid visa for studying in Romania.

Deadline

The application file must be sent to Romania by 1st of September (for undergraduate and graduate studies), but there is no deadline for PhD applicants.

Matriculation requirements

Admission to higher education institutions is based on the selection of application files.

International students have to prove good knowledge of the teaching language (Romanian, English, French or German). Usually, international students learn Romanian during the preparatory year. The candidates who speak Romanian can skip the preparatory year after having passed a test of Romanian language. The candidates who can formally prove that they have studied in Romanian for at least four years consecutively, do not need to pass the Romanian language test or to attend the preparatory year.

The Alexandru Ioan Cuza University of Iasi organizes the preparatory year: students will have to take language tests, during the academic year, in order to check their speaking and writing abilities.

Foreign students, who have begun to study in their home country or in another country, can finish their studies in Romania. This is possible according to each individual case, after the recognition and equivalence of diplomas.

ERASMUS Programme

At the beginning of the academic year (in October) or at the beginning of the second semester (in February) the students are registered temporarily, for one or two semesters, at the faculty that has an Erasmus bilateral agreement with the partner faculty. The following documents are required:

- The Transcript of Records from home faculty;
- The Learning Agreement signed by: the ECTS coordinators of home faculty and university; by the ECTS coordinator of host faculty, and by the ECTS institutional coordinator of UAIC;
- A copy of the first page of the passport/ID card;
- two ID photos.

After registration the student receives:

- A student ID card (*carnet de student*) that is valid only for the Erasmus study period. The student card may be required in the University or in any other institution where student identity needs to be proved. The student must use his card during the session of exams, when each professor will write down, under signature, the grade obtained in his/her exam.
- A travel card (*legitimație de transport*) that the student can use when he buys train tickets and season tickets for urban public transportation. By showing the student travel card he can have a 50%-discount of the price of these tickets.

The faculty that registers the student must provide him the same study conditions as for Romanian students: access to libraries, laboratories, reading rooms, Internet rooms. During study mobility at Alexandru Ioan Cuza University of Iasi, the student has the same rights and obligations as the other students of the university, except the right to receive Romanian government scholarships.

FACULTY LLLP-Erasmus COORDINATOR:

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II. INFORMATION ON DEGREE PROGRAMMES

II. 1. GENERAL DESCRIPTION

II. 1. a. QUALIFICATION AWARDED

The graduates of the first cycle of university studies (undergraduate) in Chemistry are awarded, after passing the final graduation examination, the title of Bachelor of Chemistry.

The graduates of the secondary cycle, of master studies in Chemistry, are awarded, after defending the dissertation, the title Master of Chemistry.

The graduates of the third cycle, of doctoral studies, are awarded, after defending publicly the Ph. D. Thesis, the title Doctor in Exact Sciences, field of Chemistry.

II. 1. b. ADMISSION REQUIREMENTS

- Admission for a bachelor degree (undergraduate) studies

- Academic-record based competition;
- The admission grade is calculated as follows:
  - 70% the secondary-school cumulative average grade of all years of study
  - 30% - the baccalaureate cumulative average grade

- Admission for a master degree (graduate) studies

- Academic-record based competition;
- The admission grade is calculated as follows:
  - 50% - the cumulative average grade for the undergraduate studies;
  - 50% - the general average grade for the graduation examination

II. 1. c. EDUCATIONAL AND PROFESSIONAL GOALS

The bachelors in Chemistry has to develop, during the programme of study, the following general and professional abilities:

- the ability to learn;
- the ability to work in team;
- basic PC operating skills;
- the ability to cooperate with specialists from different fields;
- the ability to build and interpret models and accurate representations of the reality;
- the ability to have an accurate perception of the reality;

- the ability to create hypotheses and check them through exploration;
- the ability to handle different strategies in solving problems;
- the ability to integrate and use new information in the frame of personal knowledge.

The graduates of the master programme has to develop, during the programme of study, the following general and professional abilities:

- the creative use of research techniques and methods to solve problems;
- the ability to elaborate studies and reports for publishing or professional use;
- the ability to lead a working team, and to communicate in various circumstances;

- the ability to act independently and creatively in approaching and solution of problems;
- the ability to lead and act for continuous professional improvement;

- the ability to produce high quality models of reality;
- the ability to adopt various strategies for the exploration and solution of a research problem/subject.

II. 1. d. ACCESS TO FURTHER STUDIES

The bachelors in Chemistry can attend, after the graduation, the master studies programme.

The masters in Chemistry can attend, after defending the dissertation, doctoral studies.

II. 1. e. COURSE STRUCTURE DIAGRAM WITH CREDITS (60 per year)

In the next pages, we present the **Schedule of courses**, for academic year 2009-2010, followed by courses descriptions, in Chapter II.2.

Table I: Compulsory and optional courses for undergraduate studies

No.	Code	Course title	Hours per week				ECTS credits	Evaluation form			
			C	S	L	Pr.		P	C	E	Mixed
1st Semester (1st Year of study)											
1	M_1101	Mathematics (Mathematical analysis)	2	2			5			E	
2	P_1101	Physics (Mechanics. Molecular physics; Waves (electric, optical))	4		2		5			E	
3	CN1101	Fundamentals of chemistry	2		4,5***		5			E	
4	CN1102	Fundamentals of inorganic chemistry	2		3		5			E	
5	CF1101	Communication techniques and programming languages	1		1		5		C		
Modern languages (optional) *(1 of 3)*											
6	L_1101	English	1	0,5			5		C		
7	L_1101	French	1	0,5			5		C		
8	L_1101	German	1	0,5			5		C		
2nd Semester (1st Year of study)											
9	M_1202	Mathematics (Linear algebra and differential equations)	2	1			5			E	
10	CO1201	Basic organic chemistry	1,5		3		5			E	
11	CN1203	Nonmetal chemistry	2		2		5			E	
12	CF1202	Chemical thermodynamics	3		3		5			E	
13	CA1201	Fundamentals of analytical chemistry (practical skills)	3		3		5			E	
******* 1.5 h CA + 2 h CO + 1 h CF											
Modern languages (optional) *(1 of 3)*											
14	L_1202	English	1	0,5			5		C		
15	L_1202	French	1	0,5			5		C		
16	L_1202	German	1	0,5			5		C		
3rd Semester (2nd Year of study)											
17	CO2302	Chemistry of hydrocarbons and single functional group compounds	4		3		5			E	
18	CF2304	Chemical kinetics	3		2,5		5			E	
19	CN2304	Chemistry of s- and p- block metals	2		1,5		5			E	
20	CA2303	Practical abilities in instrumental analysis	2		1,5		5			E	
21	CB2301	Biochemistry	2		2		5		C		
Modern languages (optional) *(1 of 3)*											
22	L_2305	English	1	0,5			5		C		
23	L_2305	French	1	0,5			5		C		
24	L_2305	German	1	0,5			5		C		
4th Semester (2nd Year of study)											
25	CN2405	Chemistry of d-block metals	3		2		5			E	
26	CF2405	Quantum chemistry and structure	3		3		5			E	
27	CM2401	Materials chemistry	2		2		5			E	
28	CO2403	Organic chemistry of multiple functional group compounds	3		3		5			E	
29	CA2404	Instrumental analysis	1,5		1		5			E	
Modern languages (optional) *(1 of 3)*											
30	L_2406	English	1	0,5			5		C		
31	L_2406	French	1	0,5			5		C		
32	L_2406	German	1	0,5			5		C		

No.	Code	Course title	Hours per week				ECTS credits	Evaluation form			
			C	S	L	Pr.		P	C	E	Mixed
5th Semester (3rd Year of study) – specialisation Chemistry											
33	CA3509	Chemistry of coordination compounds	3		2		5			E	
34	CF3507	Electrochemistry	2		2		5			E	
35	CF3508	Heterogeneous catalysis	2		2		5		C		
36	CA3510	Radiochemistry	2		2		5		C		
37	CA3512	Reaction mechanisms in inorganic chemistry	2		2		5			E	
38	CO3507	Macromolecular chemistry	2		2		5			C	
6th Semester (3rd Year of study) – specialisation Chemistry											
39	CO3606	Structural organic analysis	2		2		5			E	
40	CA3611	Trace analysis	2		1		5			E	
41	CO3608	Chemistry of organometallic compounds	2		1		5			E	
42	CF3609	Physical chemistry of interfaces and polymers	3		3		5			E	
43	CF3613	Materials chemistry	2		2		5			E	
44	CA3613	Bioinorganic chemistry	2		2		5		C		
5th Semester (3rd Year of study) – specialisation Technological Biochemistry											
45	CO3509	Structural, functional and genetic biochemistry	3		3		5			E	
46	CO3512	Nucleic acids and proteins	2		1		5			E	
47	CF3514	Membrane transport and bioenergetics	2		1		5		C		
48	CF3511	Biotechnologies	2		3		5			E	
49	CA3516	Coordination compounds with biomimetic properties	2		2		5			E	
50	CO3515	Toxicology	2		2		5		C		
6th Semester (3rd Year of study) – specialisation Technological Biochemistry											
51	CO3611	Structural analysis of bioorganic compounds	2		1		5			E	
52	CA3614	Analytical control of biotechnological processes	2		2		5			E	
53	CF3612	Quantum biochemistry	2		2		5			E	
54	CA3615	Clinical analyses	2		3		5			E	
55	CO3614	Enzymology	2		2		5			E	
56	CF3615	Biomaterials	2		3		5		C		

Table II: Elective courses (the 1st and 2nd years of study)

No.	Code	Course title	Hours per week				ECTS credits	Evaluation form			
			C	S	L	Pr.		P	C	E	Mixed
1st Semester (1st Year of study)											
1	CF1103	Computer use in chemistry (practical abilities)	1		1		5			V.P	
2	M_1102	Complements of mathematics		1			5			V.P	
3	L_1103	Modern languages	1	0,5			5		C		
4	SP1101	Physical education			1		5		C		
2nd Semester (1st Year of study)											
5	CA1202	Practical abilities in analytical chemistry			1		5			V.P	
6	L_1204	Modern languages	1	0,5			5		C		
7	SP1202	Physical education			1		5		C		
3rd Semester (2nd Year of study)											
8	CO2304	Practical abilities in organic chemistry			1		5			V.P	
9	CN2306	Practical abilities in inorganic chemistry			1		5			V.P	
10	L_2307	Modern languages	1	0,5			5		C		
11	CF2306	Numerical applications in physical chemistry			0,5		5			E	
4th Semester (2nd Year of study)											
12	CN2406	Practical abilities in inorganic chemistry			1		5			V.P	
13	L_2408	Modern languages	1	0,5			5		C		

Table III: Elective courses within the Department of Didactic Personnel Training

No.	Code	Course title	Hours per week				ECTS credits	Evaluation form			
			C	S	L	Pr.		P	C	E	Mixed
1st Semester (1st Year of study)											
1	RR1101	Educational Psychology	2	2			5			E	
2nd Semester (1st Year of study)											
2	RR1202	Pedagogy I Foundations of pedagogy. Curriculum theory and methodology	2	2			5			E	
3rd Semester (2nd Year of study)											
3	RR2303	Pedagogy II Theory and methodology of teaching. Theory and methodology of evaluation	2	2			5			E	
4th Semester (2nd Year of study)											
4	CN2410	Didactics of chemistry	2	2			5			E	
5th Semester (3rd Year of study)											
5	RR35_	Optional (1 of 3) - Psycho-sociology of educational groups - Educational communication - Inclusive theories and practices in education	1	2			4		C		
6	C_3501	Teaching practicum (chemistry)	-		3		-		C		
6th Semester (3rd Year of study)											
7	C_3602	Teaching practicum (chemistry)	-		3		5		C		
8	RR3604	Final evaluation – Teaching portfolio		1			1			E	

Table IV: Compulsory and optional courses for graduate studies

No.	Code	Course title	Hours per week				ECTS credits	Evaluation form			
			C	S	L	Pr.		P	C	E	Mixed
1st Semester (1st Year of study) – specialisation Chemistry of cosmetics and pharmaceutical products											
M1	CO4142	Advanced organic chemistry	2		2		6			E	
M2	CN4144	Therapeutical inorganic chemistry	2		2		6			E	
M3	CB4102	Special chapters of biochemistry	2		2		6			E	
M4	CS4102	Medicines of bio and semisynthesis	2		2		6			E	
Optional (1 of 2)											
M5	CF4130	*Physical chemistry of biocompatible polymers*	2		2		6			E	
M6	CF4131	*Advanced physical chemistry*	2		2		6			E	
2nd Semester (1st Year of study) – specialisation Chemistry of cosmetics and pharmaceutical products											
M7	CF4229	Electrochemical processes involved in drug activity	2		2		6			E	
M8	CN4245	Advanced bioinorganic chemistry	2		2		6			E	
M9	CO4243	Synthetic medicines	2		2		6			E	
M10	CA4217	Chromatographical techniques in the analysis of medicines and cosmetics	1		3		6			E	
Optional (1 of 2)											
M11	CM4208	*Biocompatible nanomaterials*	2		2		6			E	
M12	CM4209	*Biotechnological processes in pharmaceutical industry*	2		2		6			E	
1st Semester (1st Year of study) – specialisation Environment chemistry and food safety											
M13	CN4149	Coordination compounds in natural systems and environment protection	2		2		6			E	
M14	CF4134	Enzymatic kinetics	2		2		6			E	
M15	CO4147	Advanced topics in organic chemistry	2		2		6			E	
M16	CF4135	Chemical energetics applied in natural systems	2		2		6			E	
Optional (1 of 2)											
M17	CM4110	*Food chemistry*	2		2		6			E	
M18	CM4111	*Advanced topics in biochemistry*	2		2		6			E	
2nd Semester (1st Year of study) – specialisation Environment chemistry and food safety											
M19	CO4248	Natural compounds	2		2		6			E	
M20	CB4203	Enzymology	2		2		6			E	
M21	CS4207	Enzymatic processes in environment and food	2		2		6			E	
M22	CN4250	Pollutants	2		2		6			E	
Optional (1 of 2)											
M23	CA4219	*Analytical toxicology*	2		2		6			E	
M24	CA4220	*Speciation analysis*	2		2		6			E	

No.	Code	Course title	Hours per week				ECTS credits	Evaluation form			
			C	S	L	Pr.		P	C	E	Mixed
3rd Semester (2nd Year of study) – specialisation Chemistry and Biochemistry of Heterocycles											
M100	CM5330	Management of scientific research	2		2		6			E	
M101	CO5323	Special topics in heterocyclic chemistry	2		2		6			E	
M102	CO5327	Synthesis and characterization of polypeptides	2		2		6			E	
M103	CO5325	Fine organic synthesis I	0,5		1,5		6		C		
Optional (1 of 3)											
M104	CO5314	*Molecular transpositions*	2		2		6			E	
M105	CM5305	*(Nano)porous inorganic structures*	2		2		6			E	
M106	CA5311	*Chemometrics and analytical signal processing*	2		2		6			E	
4th Semester (2nd Year of study) – specialisation Chemistry and Biochemistry of Heterocycles											
M107	CO5423	Methods for investigation of reaction mechanisms	2	2			6			E	
M108	CO5428	Organic structural analysis	2		2		6			E	
M109	CO5443	Medicines of semisynthesis	2		2		6			E	
M110	CO5426	Fine organic synthesis II	0,5		3,5		6		C		
Optional (1 of 3)											
M111	CO5430	*Natural compounds*	2		2		6			E	
M112	CM5406	*Catalysts and advanced/clean catalytic processes*	2		2		6			E	
M113	CF5416	*Kinetics of chain reactions*	2		2		6			E	
3rd Semester (2nd Year of study) – specialisation Applied coordination chemistry											
M114	CN5320	Reactivity of coordination compounds	2	2			6			E	
M115	CN5325	Coordination chemistry of f-block elements and super heavy elements	2	1	1		6			E	
M116	CN5322	Inorganic compounds with special properties	2	2			6			E	
M117	CN5323	Quantitative analysis of structural data - properties interdependence for coordination compounds	2	2			6			E	
Optional (1 of 3)											
M118	CM5305	*(Nano)porous inorganic structures*	2	2			6			E	
M119	CO5314	*Molecular transpositions*	2		2		6			E	
M120	CA5311	*Environmetrics*	2		2		6			E	
4th Semester (2nd Year of study) – specialisation Applied coordination chemistry											
M121	CN5424	Advanced bioinorganic chemistry	2	2			6			E	
M122	CN5421	Elaboration of inorganic materials	2	2			6			E	
M123	CN5426	Radiochemical techniques in the investigation of coordination compounds	2		2		6			E	
M124	CN5427	Inorganic materials used for energy conversion	2	2			6			E	
Optional (1 of 3)											
M125	CM5406	*Catalysts and advanced/clean catalytic processes*	2	2			6			E	
M126	CO5415	*Utilisation of the organometalloidic compounds in organic synthesis*	2		2		6			E	
M127	CF5416	*Kinetics of chain reactions*	2	1	1		6			E	

No.	Code	Course title	Hours per week				ECTS credits	Evaluation form			
			C	S	L	Pr.		P	C	E	Mixed
3rd Semester (2nd Year of study) – specialisation Dynamics of chemical systems applied in environmental chemistry											
M128	CF5317	Nonlinear dynamics and dynamics of chemical systems	2	1	1		6			E	
M129	CF5318	Physical chemistry of polymers	2		2		6			E	
M130	CA5312	Environmental monitoring and analytical control in environmental remediation	2		2		6			E	
M131	CF5320	Dynamics of intermolecular interactions	2		2		6			E	
Optional (1 of 3)											
M132	CA5311	*Chemometrics and analytical signal processing*	2		2		6			E	
M133	CM5305	*(Nano)porous inorganic structures*	2	2			6			E	
M134	CO5314	*Molecular transpositions*	2		2		6			E	
4th Semester (2nd Year of study) – specialisation DSCACM Dynamics of chemical systems applied in environmental chemistry											
M135	CA5413	Speciation analysis applied to environmental studies	2		2		6			E	
M136	CF5419	Atmospheric processes in gaseous phase	2		2		6			E	
M137	CF5421	Special topics in physical chemistry	2	1	1		6			E	
M138	CA5414	Analytical chemistry of persistent chemical pollutants	2		2		6			E	
Optional (1 of 3)											
M139	CF5416	*Kinetics of chain reactions*	2		2		6			E	
M140	CM5406	*Catalysts and advanced/clean catalytic processes*	2	2			6			E	
M141	CO5415	*Utilisation of the organometalloidic compounds in organic synthesis*	2		2		6			E	
3rd Semester (2nd Year of study) – specialisation Didactics of chemistry											
M142	CO5333	Portfolio for didactic exams	2	2			8			E	
M143	CN5333	Technical inorganic compounds	2	2			8			E	
M144	CO5332	Evaluation of teaching skills - Practicum	1	3			8			E	
Optional (1 of 2)											
M145	CN5338	*Fundamentals of environmental chemistry*	2	2			6			E	
M146	CN5339	*Quantitative analysis of structural data - properties interdependence for coordination compounds*	2	2			6			E	
4th Semester (2nd Year of study) – specialisation Didactics of chemistry											
M147	CO5431	Strategies in organic synthesis	2	2			8			E	
M148	CN5432	Advanced bioinorganic chemistry	2	2			8			E	
M149	CO5434	Portfolio for didactic exams - Practicum	1	3			7			E	
Optional (1 of 2)											
M150	CO5435	*Biological active organic compounds*	2	2			7			E	
M151	CO5436	*Natural compounds*	2		2		7			E	
M152		Elaboration of dissertation work								E	

Table V: Facultative courses within the Department of Didactic Personnel Training

No.	Code	Course title	Hours per week				ECTS credits	Evaluation form			
			C	S	L	Pr.		P	C	E	Mixed
1st Semester (1st Year of study)											
1	RR4106	Psycho-pedagogy of teenagers, young and adults	2	1			5			E	
2	RR4110	Optional I (1 of 4) *- Educational communication* *- Counseling and vocational orientation* *- Methodology of educational research* *- Integrated education*	1	2			5			E	
2nd Semester (1st Year of study)											
3	RR4207	Design and management of educational programmes	2	1			5			E	
4	RR4211	Optional II (1 of 5) *- Fundamentals of special psychopedagogy* *- Management of school organization* *- Intercultural education* *- Contemporary pedagogical doctrines*	1	2			5			E	
3rd Semester (2nd Year of study)											
5	CN5328	Didactics and recent advances in didactics of the field	2	1			5			E	
6	C_5303	Pedagogical traineeship			3		5		C		
4th Semester (2nd Year of study)											
7	Graduation exam – the 2nd level						5			E	

II. 1. f. EXAMINATION AND ASSESSMENT REGULATIONS

1. Each teaching activity from the syllabus ends with a final assessment;

2. The type of assessment, the evaluation criteria, bibliographic references are decided by the professor. The students will be announced about them at the beginning of the semester when that matter is studied.

3. The final grade the students receive for a given matter is calculated as follows:

a. At least 50% of the grade is a result of evaluation(s) realized during the semester;

b. At most 50% of the grade is a result of the final examination.

4. The exams are passed in front of a commission formed by the professor who taught the lecture and the professor who led the seminars/practical activities.

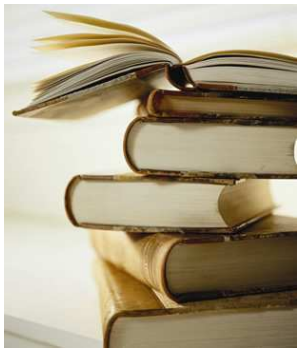
5. The assessment results consist in grades between 1 and 10, where the minimum grade to pass an exam is 5.

Every section of specialisation works on the basis of individual teaching program. Students can transfer from a section to another if they accumulate the corresponding number of credits.

All study programs include compulsory, optional and elective disciplines. All students have the possibility to study optionally the disciplines within the Department of Didactic Personnel Training.

Every discipline is provided with a certain number of credits. Students hierarchy is established according to the outline obtained by totality of the products: grade obtained multiplied by the credits for all disciplines.

II. 1. g. FINAL EXAMINATION



1. **First Cycle** – undergraduate studies

The undergraduate studies end with a bachelor (graduation) examination. This is organized following the rules adopted by the Senate and the Ministry of Education.

The graduation exam consists in two oral examinations:

- Evaluation of the fundamental and specialty knowledge;
- The defense of the graduation thesis.

The minimum grade to pass each test is 5 from 10. The minimum final grade to pass the graduation exam is 6.

2. **Second cycle** – master studies

Master studies end with the public defense of the dissertation thesis.

II.2. DESCRIPTION OF INDIVIDUAL COURSE UNITS

Compulsory, optional and elective courses for undergraduate studies

COURSE TITLE	**MATHEMATICS (LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS)**	CODE: M_1202

YEAR OF STUDY	I	SEMESTER	2	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR OF SCIENCE	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD, PROFESSOR SEBASTIAN ANIȚA

OBJECTIVE OF THE COURSE	Acquisition of new and organized knowledge of Algebra and Differential Equations Development of mathematical intellectual abilities in modelling the phenomena Solving theoretical and practical problems
PREREQUISITES	High School Mathematics
COURSE CONTENTS	Matrices and determinants Linear algebraic systems Linear spaces and linear operators on finite dimensional spaces Eigenvalue and eigenvectors Separable, linear and exact equations Higher-order differential equations din superior. Systems of first-order linear equations

RECOMMENDED READING	1. N. Donciu, D. Flondor, *Algebră şi analiză matematică. Culegere de probleme*, vol. I, II, EDP, Bucureşti, 1978 2. C. Niță, C. Năstăsescu, C. Vraciu, Bazele algebrei, vol. I, Editura Academiei, Bucureşti, 1986
TEACHING METHODS	Lecture

ASSESSMENT METHODS	Written assignments, continuous evaluation
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**PHYSICS (MECHANICS. MOLECULAR PHYSICS; WAVES (ELECTRIC, OPTICAL))**	CODE: P_1101

YEAR OF STUDY	I	SEMESTER	1	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD ASSOC. PROFESSOR D. ALEXANDROAEI, PHD LECTURER V. POHOAȚĂ PHD LECTURER D. CIMPOEȘU

OBJECTIVE OF THE COURSE	Learning fundamental concepts of classical mechanics, molecular physics and thermal phenomena; the electric and magnetic phenomena with the experimental basics and the mathematical approach to the electromagnetic equations. Learning the fundamental properties of the optical radiations; phenomena which involve optical radiation properties; spectral apparatus usage and specifications; light spectral analyses; interactions during light propagation with matter.
PREREQUISITES	Basic knowledge of lyceum mathematics and general physics
COURSE CONTENTS	- Kinematics and dynamics of the material point. Particular movements of the material point (planetary type of movement, oscillatory movement). Dynamics of the material-points systems. Rigid body. Physical systems with enormous number of particles, distribution function - Boltzmann equation, transport phenomena. Elements of thermodynamics – internal energy, heat quantity, mechanical work and the principles of the thermodynamics. Real thermodynamic systems. - Electrostatics - (electric field, electric potential, conductors), electric field in matter (dielectrics, polarization). Direct current circuits. Magnetostatics, magnetic field in matter (magnetization, diamagnets, paramagnets, ferromagnets), electromagnetic induction. Maxwell's equations. - Harmonic plane waves propagation in isotropic dielectrics. Light specific state of polarization. Malus's law. Specific rotation. The reflection and refraction of light. Light dispersion. Light absorption. Molecular absorption UV-VIS spectra qualitative analysis. Jablonski's diagram. Molecular fluorescence spectra quantitative analysis. Light scattering. Geometrical optics: dioptre, mirrors, lenses.

RECOMMENDED READING	1.Curs de Fizică Generală - Elemente de Mecanică, Fizică Moleculară şi Termodinamică – *D.Alxandroaei* – Editura Stef, Iaşi, 2008 2. Cursul de Fizica "Berkeley" - Mecanica - *Kittel s.a* – Edit. Didact. şi Pedag., Bucuresti 1981 3. Fizica vol. 1^2 - *D.Halliday, P.Resnick* - Editura Didactică şi Pedagogică, Bucuresti 4. Fizica Generală - *E. Luca, Gh.Zett* - Editura Didactică şi Pedagogică, Bucuresti 1981 5. Fizica Generală - *R Titeica, I.I.Popescu* - Editura Tehnică, 1971 6. Mecanica si Acustica - *A.Hristev* – Editura Didactică şi Pedagogică, Bucuresti, 1982 7. Fizica Modernă - *R.Feynmann* – Editura Tehnică, Bucuresti, 1969 8. Fizica pentru ingineri - *George C.Moisil* – Editura Tehnică, 1965 9. Termodinamica - *I.P.Bazarov* – Editura Tehnică, Bucureşti, 1967 10. Experimente de Fizica Generală si Biofizică - *D.Alexandroaei, D.Creanga, M. Delibas... D.Timpu* – Editura Universităţii "Al.I.Cuza" Iaşi, 2000 11. Electricitate si Magnetism - *L. Mitoşeriu, V. Ţura*, - Ed. Univ. "Al. I. Cuza" Iaşi, 2000 12. Electricitate si magnetism, vol. I si II - *V. Tutovan* - Ed. Tehnică, Bucureşti, 1985 13. Cursul de Fizică "Berkeley" - Electricitate şi Magnetism, - *E.M. Purcell* - Ed. Didactică şi Pedagogică, Bucureşti, 1982 14. Curs de optică - *M. Delibaş* - Ed. Univ. "Al. I. Cuza", Iaşi (1998). 15. Lucrări practice de optică - *M. Delibaş, D. Dorohoi* - Ed. Univ. "Al. I. Cuza", Iaşi (1999).
TEACHING METHODS	Course exposes representative's experiments and consultations.

ASSESSMENT METHODS	Partial evaluations of course contents	Writing exam in 8th week - 50% Writing exam in 16th week - 50%
	Final mark	Continues assessment of laboratory activity - 50% Writing exams - 50%
LANGUAGE OF INSTRUCTION	Romanian	

COURSE TITLE	**FUNDAMENTALS OF CHEMISTRY**	CODE:CN1101

YEAR OF STUDY	I	SEMESTER	1	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. LECTURER MIRELA GOANTA

OBJECTIVE OF THE COURSE	The student should acquire knowledge about structure of the atom, the structure of the molecule and the chemical reactions. The final aim is student ability to firesee the evolution of distinct chemical processes.
PREREQUISITES	
COURSE CONTENTS	Symbols of elements. Atomic structure. Chemical formulas. The atomic and molecular conceptfundamentals of chemical reactions. Electrons and properties of elements. Structure of the atom, mendeleev periodic law. Development of the periodic law. The empirical chemical bond and the structure of molecules. Fundamenal laws of chemical reactions. Chemical reactions stoichiometry. Metal and nonmetal oxides. Bases. Acids. Salts. Nomenclature, obtain, properties.

RECOMMENDED READING	1. C.D. Nenițescu, *Chimie generală*. EDP, Bucureşti, 1978 2. D.F. Shriver, *Inorganic Chemistry*, Oxford, 1990 3. F.A. Cotton, G. Wilkinson, P.L. Gauss, *Basic Inorganic Chemistry*, J. Wiley, 1995 4. Erwin Riedel, *Anorganische Chemie*, Walter de Gruyter, Berlin, New York, 1994 5. N. Foca, D. Condurache, M. Goanță, S. Oancea, *Chimie Anorganică-Structura elementelor chimice şi a combinațiilor anorganice*, Editura „Gh. Asachi", Iaşi, 2002 6. C. Janiak, T.M. Klapoetke, H.-J. Meyer, *Moderne Anorganische Chemie,* , Walter de Gruyter, Berlin, New York, 2003
TEACHING METHODS	Lecture, interactiv methods, case study

ASSESSMENT METHODS	Partial, during the semester (50%) + written examination (50%)
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**FUNDAMENTALS OF INORGANIC CHEMISTRY**	CODE: CN1102

YEAR OF STUDY	I	SEMESTER	1	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR OF SCIENCE	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. PROFESSOR MIRCEA-NICOLAE PALAMARU

OBJECTIVE OF THE COURSE	The student should obtain knowledge about rules of chemical phenomena and atomic structure as well as chemical bonds and state of aggregation. And the chemical reactions. The student should apply theoretical knowledge in calculations.
PREREQUISITES	Knowledge of chemistry, physics and mathematics on the level of secondary school. Course Foundamentals Chemistry
COURSE CONTENTS	Atomic nucleus and electrons. Quantum theory. Atomic and ionic structure. Regularity in periodic table. Chemical bonds (ionic bonding, covalent bonding – two center bonds, multicenter covalent bonding). States of aggregation. Crystalline structure of matter. Oxidation-Reduction Reactions. Inorganic Chemical Nomenclature .

RECOMMENDED READING	1. C.D. Nenițescu, *Chimie generală*. EDP, Bucureşti, 1978. 2. D.F. Shriver, *Inorganic Chemistry*, Oxford, 1990. 3. F.A. Cotton, G. Wilkinson, P.L. Gauss, *Basic Inorganic Chemistry*, J. Wiley, 1995. 4. Y.Jean, F. Volatron, *Atomistique et liaison chimique*, Ediscience International, 1995. 5. M.N. Palamaru, C. Mâță, D. Humelnicu, A.F. Popa, M. Goanță, N. Cornei, *Bazele Chimiei Anorganice.Lucrări practice şi aplicații*, Editura Universității „Al.I.Cuza" Iași, 2003. 6. A.Gulea, I.Sandu, M.Popov, *Lucrări practice de chimie anorganică*, Chişinău, Ştiința, 1994. 7. S. Desreux, E. Curis, L. Heinrich, Architecture de la matiere, Breal Rosny, 1998 8. J.Derek Woollins, Inorganic Experiments, Wiley-VCH, 2003
TEACHING METHODS	Lecture, interactiv methods, mcase study

ASSESSMENT METHODS	Conditions: 100% attendance for laboratory works Forms: examination durind the semester and final written examination Final grade calculation: 50% examen and 50% laboratory
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**ENGLISH**	CODE: L_1101

YEAR OF STUDY	I	SEMESTER	1	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	OC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR OF SCIENCE	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. ASSISTANT MARIANA HURHUI

OBJECTIVE OF THE COURSE	• Skill of comprehending a text, listened to, or read; • Lexico-grammatical skill; • Skill of identifying some communicative functions and of recontextualizing them; • Skill of distinguishing between registers of English; • Skill of communicating and interacting, orally and in writing, in various everyday life situations;
PREREQUISITES	Basic notions of English
COURSE CONTENTS	• People and social relations; the tense system; the present, simple and continuous; the present perfect; syntax of questions and of negations; expressing preferences, describing appearances; • Past tenses; expressing and describing actions finished in the past; asking questions about what has happened recently; • Sequence of tenses; narrative tenses; • The future; using tenses in subordinate clauses; • Relative Clauses; • Units 1-6 New Headway;

RECOMMENDED READING	• Galateanu, G. Comisel E., Gramatica limbii engleze, Ed Didactica si pedagogica, Buc., 1982; • Thomson A J., A V Martinet, A Practical English Grammar, OUP, 1980; • Thomson A J, A V Martinet, A Practical English Grammar, Exercises 1, OUP, 1980; • Thomson A J, A V Martinet, A Practical English Grammar, Exercises 2, OUP, 1980; • Galea I, Stanciu, V., English with Tears, Cluj, Dacia, 1999; • Chilarescu M., Paidos, C., Proficiency in English, Iasi, Institutul european, 1996; • Soars, Liz and John, New Headway English Course, Upper Interediate, OUP, 1993;
TEACHING METHODS	Communicatively-interactive;

ASSESSMENT METHODS	Continual assessment, midterm paper, individual study, final evaluation;
LANGUAGE OF INSTRUCTION	English

COURSE TITLE	**FRENCH**	CODE: L_1101

YEAR OF STUDY	I	SEMESTER	I	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	OC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR OF SCIENCE (BEGINNERS)	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PREP. DRD. IRINA DURDUREANU

OBJECTIVE OF THE COURSE	**Objectives of the course:** - To be able to identify and use correctly the studied vocabulary and grammar items of the French language, orally as well as in writing, in contexts of authentic communication; - To be able to understand better the French culture and civilization items, in relation with the progress of the modern world; - To be able to use the knowledge of the French language and the acquired communication competences that are necessary for a better social and professional integration;
PREREQUISITES	Previous study of French during college.
COURSE CONTENTS	**Contents of the course:** 1. Initial evaluation of competences in the French language: written test. 2. Initial account: synthesis of the results, correction of the test, presentation of the working schedule: objectives, themes, methods. 3. Grammar problems: - The Nominal Group: the Definite, Indefinite and Partitive Article; - [The Categories of] The Number and the Gender; - The Verb: Mood and Tense Forms; - Sequence of Tenses in the Indicative Mood; - Si Clauses; - Past Participle Agreement; - The Pronouns, the Adverbial Pronouns; - The Interrogative Sentence; - The Negative Sentence; 4. Communication and culture: - In a voyage, by different means of transport; - At the hotel, at the post office, on the phone, at the restaurant; - Shopping: at the market, universal stores; - Leisure: at the cinema, television, trips.

RECOMMENDED READING	**Bibliography:** ➢ J.-C. Chevalier, C. Blanche Benveniste, M. Arrivé, J. Peytard, *Grammaire du français contemporain*, Paris, Larousse, 1997 (Larousse Références) ➢ Ch. Abbadie, B. Chevelon, M-H. Morsel, *L'expression française écrite et orale*, PUF de Grenoble, 1993 ➢ M.Saras, M. Stefanescu, *Gramatica practica a limbii franceze*, Bucuresti, Meteor Press, 2004 ➢ Aurelian Tanase, *Exercitii de gramatica franceza*, Bucuresti, Editura Stiintifica, 1964 ➢ Laura Anghel, *Exercitii de gramatica franceza*, II, Bacau, Editura Plumb, 1999
TEACHING METHODS	Theoretical course combined with interactive exercises in the seminary.

ASSESSMENT METHODS	
LANGUAGE OF INSTRUCTION	French

COURSE TITLE	**GERMAN**	CODE: L_1101

YEAR OF STUDY	I	SEMESTER	1	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	OC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR OF SCIENCE	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. ASSIST. DELIA ESIAN

OBJECTIVE OF THE COURSE	The course is meant to familiarize first-year students with basic notions of the German language. With the help of an interactive methodology, which allows students to ask questions and come up with their own comments and pieces of knowledge during lectures, the students are offered the necessary help to acquire a good understanding of the German language and give feedback to the lecturer.
PREREQUISITES	Romanian language.
COURSE CONTENTS	The course will include presentations of both German culture and German language with illustrative communicational situation examples selected mainly from the present day manuals and audio materials. The students will be confronted to everyday-situations of the german langauge culture. For tests, students shall make use of information acquired during lectures, as well as of data extracted from recommended bibliography.

RECOMMENDED READING	• *Studio D. Gesamtband 1-2. Kurs- und Arbeitsbuch. Einheit 1-12 – Europäischer Referenzrahmen A 1 (Lernmaterialien)* 2007. • CD: Studio D. Gesamtband 1. Kurs- und Arbeitsbuch. Einheit 1-12 – Europäischer Referenzrahmen A 1 (Lernmaterialien) 2007. • Paul Rusch, Helen Schmitz: *Einfach Grammatik. Übungsgrammatik Deutsch A1 bis B1*. Langenscheidt: Berlin/ München 2007.
TEACHING METHODS	lectures, workshops.

ASSESSMENT METHODS	homeworks; final tests, projects, interviews.
LANGUAGE OF INSTRUCTION	Romanian and German

COURSE TITLE	**MATHEMATICS (MATHEMATICAL ANALYSIS)**	CODE: M_1202

YEAR OF STUDY	I	SEMESTER	2	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR OF SCIENCE	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD PROFESSOR SEBASTIAN ANIȚA

OBJECTIVE OF THE COURSE	Acquisition of new and organized knowledge of Mathematical Analysis Development of mathematical intellectual abilities in modelling the phenomena Solving theoretical and practical problems
PREREQUISITES	High School Mathematics
COURSE CONTENTS	Sequences and series of real numbers. Convergence. Limits Continuous functions. Properties of continuous functions defined on compact intervals Differentiable functions. Properties. Mean value theorems and consequences Riemann integrals and improper integrals The metric space R^n Functions of several variables. Limits. Continuous functions. Differentiable functions Multiple integrals Mathematical models governed by differential equations Separable, linear and exact equations First-order differential equations. Existence and uniqueness of the solution to Cauchy problem Higher-order differential equations din superior. Fourier method for partial differential equations

RECOMMENDED READING	1. N. Donciu, D. Flondor, *Algebră şi analiză matematică. Culegere de probleme*, vol. I, II, EDP, Bucureşti, 1978 2. V. Barbu, Ecuații diferențiale, Editura Junimea, Iași, 1985 3. A.-M. Precupanu, Bazele analizei matematice, Ed. POLIROM Iasi, 1998
TEACHING METHODS	Lecture

ASSESSMENT METHODS	Written assignments, continuous evaluation
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**BASIC ORGANIC CHEMISTRY**	CODE: CO1201

YEAR OF STUDY	I	SEMESTER	2	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. PROFESSOR IONEL MANGALAGIU

OBJECTIVE OF THE COURSE	**Aims**: Fundamental knowledge's in organic chemistry. **Objectives**: Students will be able at the end of the course to have a coherent general vision concerning the basically knowledge of organic chemistry. Also, to have deep knowledge's concerning some specifically topics.
PREREQUISITES	High Scholl Chemistry
COURSE CONTENTS	I.An Introduction to Structure and Bonding in Organic Chemistry II.Covalent Bonding and Chemical Reactivity III. Isomerism in organic compounds (composition, conformation and configurations isomers); IV. Reaction Pathways (incuding Interemediars in Organic Chemistry).

RECOMMENDED READING	1. Nenițescu, C.D. Chimie Organică, Vol. I, II, Ed. Didactică şi Pedagogică, Bucureşti, 1980. 2. Seyhan, E. Organic Chemistry, Second Edition, D.C. Heath and Company, Lexington, Massachusets/Toronto, 1989. 3. Solomons, T.W.G. Fundamentals of Organic Chemistry, 5th Edition, John Wiley & Sons, New York/ Chichester/Brisbane/Toronto/Singapore, 1992 4. Avram, M. Chimie Organică, Ed. Zecasian, Bucureşti,1999. 5. Vollhardt, K.P.C.; Schore, N.E.; Organic Chemistry, W.H. Freeman and Company, New York, 2002. 6. Nicolaescu, T., Cireş, L.: Chimia hidrocarburilor, Ed. Univ. "Al. I. Cuza" Iaşi (rotaprint), Iaşi, 1996. 7. Mangalagiu, I. : Probleme de chimie organică, Ed. Dosoftei, IASI, 2000.
TEACHING METHODS	Mixed: modern and classics

ASSESSMENT METHODS	Conditions: Practical works and seminarium are compulsory. Evaluation: Written examination during semester Written+ spoken examination at the final of semester Marks: scale: 1 to 10 40 % - evaluation during semester 60%- final exam
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**NONMETAL CHEMISTRY**	CODE: CN1203

YEAR OF STUDY	I	SEMESTER	2	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. ASSOC. PROF. HUMELNICU DOINA

OBJECTIVE OF THE COURSE	Students will be able to understand the physical and chemical properties of nonmetals and their compounds. Students have to understand the toxic and benefic role of the nonmetals in organism.
PREREQUISITES	Basic of Inorganic Chemistry, Fundaments of Chemistry
COURSE CONTENTS	General character of nonmetals, obtaining, structure, properties and utilizations of these and the representatives compounds of hydrogen, inertes gases, halogens, oxygen, sulfur, nitrogen, phosphorus, carbon, siliceous and boron.

RECOMMENDED READING	1. I. Berdan, N.Calu – *Chimie anorganică, Nemetale*, Ed. Univ. "Al. I. Cuza" Iasi, 1992 2. W.L.Jolly – *Modern Inorganic Chemistry*, McGraw-hill Book Company, New York, 1985 3. F. A. Cotton, G. Wilkinson – *Advanced Inorganic Chemistry*, 5th ed. John Wiley, New York, 1988 4. Gh. Marcu, M. Rusu, V. Coman – *Chimie anorganica. Semimetale si nemetale*, Editura Eikon, Cluj Napoca, 2006 5. A. Pui - *Oxigenul*, Ed. Tehnopress, Iasi, 2008
TEACHING METHODS	Lecturer, Interactive methods (euristic methods: learning by discovery; guided discovery), case study

ASSESSMENT METHODS	Written examination
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**CHEMICAL THERMODYNAMICS**	CODE: CF1202

YEAR OF STUDY	I	SEMESTER	2	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR OF SCIENCE	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PH. D. PROFESSOR GELU BOURCEANU

OBJECTIVE OF THE COURSE	Applications of thermodynamics principles on systems where chemical reactions develop. One studies the reactions thermal effect and the law of conservation of energy, in the conformity with the first principle of thermodynamics. In the second part, are analyzed the chemical systems evolution to thermodynamic equilibrium state and its stability, in agreement with the second law.
PREREQUISITES	Mathemathics, Physics, General chemistry
COURSE CONTENTS	State variables; state parameters, state functions, extensive and intensive variables. The equivalence between work and heat. Internal energy, enthalpy. Differential and integral thermal effect. Caloric capacities and their variation with temperature. Kirchhoff's equation and Hess' law. The second law of thermodynamics or the evolution law. Entropy, Helmhotz and Gibbs potentials, chemical affinity and the entropy product. Chemical potentials, fugacity and activity. The change in the thermodynamic functions upon mixing, excess themodynamical functions. Physical equilibrium, Gibbs phases rule. Phase equilibria for one-component and for two-component systems. Clausius-Clapeyron equation, respectively Rault's and Henry's equation. Real solutions. Chemical equilibrium. Law of mass action. Van't Hoff reaction isotherm and van't Hoff reaction isobar. Chemical equilibrium in the systems with simultaneous reactions. Linear dependent and independent reactions. Calculus of equilibrium constants and of the composition of this kind of systems. Phase transitions thermodynamics. Ehrenfest's theorems. Chemical systems stability. Functions of maximum and minimum.

RECOMMENDED READING	1. I. Prigogine and R. Defay, *Chemical Thermodynamics*, Longmans, 1954; 2. G. Bourceanu, *Chemical Thermodynamics Fundamentals*, Ed. Univ. "Al. I. Cuza" Iaşi, 1998, 2005; 3. P. W. Atkins, *Monography of Chemical Physics*, Ed. Tehnică, Bucureşti, 1996; 4. G. Bourceanu, A. Birzu, *Thermodynamics of evolution and Nonlinear dynamics*, Ed. Matrix, Bucureşti, 2004; 5. S. I. Sandler, *Chemical and Engineering Thermodynamics*, John Wiley & Sons, 1989.
TEACHING METHODS	Presentation

ASSESSMENT METHODS	Written and Oral Examination
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**FUNDAMENTALS OF ANALYTICAL CHEMISTRY**	CODE: CA1201

YEAR OF STUDY	I	SEMESTER	2	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	**CC**

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. PROFESSOR DULMAN VIORICA

OBJECTIVE OF THE COURSE	This course creates the premises necessary for a good theoretical and practical training which can further be used to accomplish complex analysis. The student should obtain theoretical, practical and fundamentals knowledge of analytical chemistry
PREREQUISITES	Fundamentals of anorganic chemistry, Physics, Mathematics
COURSE CONTENTS	The first part of this course presents general notions about some reactions used in analytical chemistry, chemical analysis, solutions. Then the equilibria are described: acid-basis, redox, complexation, precipitation, at the same time with the titrimetric methods based on these reactions. Finally it is briefly treated the gravimetry : principles and examples in briefly treated.

RECOMMENDED READING	1. C. Liteanu, E. Hopârtean, Chimie analitică cantitativă. Volumetria, EDP, Buc., 1972. 2. Al. Duca, Al. Nacu, Cl. Calu, Chimie analitică şi analiză instrumentală, vol. I, I.P.I. 1980. 3. S. Fişel, A. Bold, R. Mocanu, I. Sârghie, Chimie analitică cantitativă, Gravimetria, EDP. Buc., 1972. 4. L. Kekedy, Chimie analitică calitativă, Ed. Scrisul Românesc, Craiova, 1982. 5. V. Dulman – Bazele Chimiei Analitice, Ed. PIM, Iaşi, 2002.
TEACHING METHODS	Lecture

ASSESSMENT METHODS	Written examination
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**ENGLISH**	CODE: L_1202

YEAR OF STUDY	I	SEMESTER	2	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	OC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR OF SCIENCE	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. ASSIST. MARIANA HURJUI

OBJECTIVE OF THE COURSE	• Skill of comprehending a text, listened to, or read; • Lexico-grammatical skill; • Skill of identifying some communicative functions and of recontextualizing them; • Skill of distinguishing between registers of English; • Skill of communicating and interacting, orally and in writing, in various everyday life situations;
PREREQUISITES	English for Non-philological Studies, I term
COURSE CONTENTS	• Relative clauses; grammatical synonymy; participial and infinitival forms; • ‚-ing' forms; verbs followed by gerund or by infinitive; ‚Doing without' • modal verbs; ‚Famous for Fifteen Minutes'; • types of interrogatives and of negatives; ‚Nothing but the Truth'; • expressing habits; ‚Things Ain't what they Used to be'; • hypothesising/the conditional: types and grammatical synonymy; ‚If Only Things were Different'; • ‚Icons';

RECOMMENDED READING	• Galateanu, G. Comisel E., Gramatica limbii engleze, Ed Didactica si pedagogica, Buc., 1982; • Thomson A J., A V Martinet, A Practical English Grammar, OUP, 1980; • Thomson A J, A V Martinet, A Practical English Grammar, Exercises 1, OUP, 1980; • Thomson A J, A V Martinet, A Practical English Grammar, Exercises 2, OUP, 1980; • Galea I, Stanciu, V., English with Tears, Cluj, Dacia, 1999; • Chilarescu M., Paidos, C., Proficiency in English, Iasi, Institutul european, 1996; • Soars, Liz and John, New Headway English Course, Upper Interediate, OUP, 1993;
TEACHING METHODS	Communicatively-interactive;

ASSESSMENT METHODS	Continual assessment, midterm paper, individual study, final evaluation
LANGUAGE OF INSTRUCTION	English

COURSE TITLE	**FRENCH**	CODE: L_1202

YEAR OF STUDY	I	SEMESTER	2	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	OC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR OF SCIENCE (BEGINNERS)	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PREP. DRD. IRINA DURDUREANU

OBJECTIVE OF THE COURSE	**Objectives of the course:** - To be able to identify and use correctly the studied vocabulary and grammar items of the French language, orally as well as in writing, in contexts of authentic communication; - To be able to understand better the French culture and civilization items, in relation with the progress of the modern world; - To be able to use the knowledge of the French language and the acquired communication competences that are necessary for a better social and professional integration;
PREREQUISITES	Previous study of French during college.
COURSE CONTENTS	**Contents of the course:** 5. Initial evaluation of competences in the French language: written test. 6. Initial account: synthesis of the results, correction of the test, presentation of the working schedule: objectives, themes, methods. 7. Grammar problems: - The Nominal Group: the Definite, Indefinite and Partitive Article; - [The Categories of] The Number and the Gender; - The Verb: Mood and Tense Forms; - Sequence of Tenses in the Indicative Mood; - Si Clauses; - Past Participle Agreement; - The Pronouns, the Adverbial Pronouns; - The Interrogative Sentence; - The Negative Sentence; 8. Communication and culture: - In a voyage, by different means of transport; - At the hotel, at the post office, on the phone, at the restaurant; - Shopping: at the market, universal stores; - Leisure: at the cinema, television, trips.

RECOMMENDED READING	**Bibliography:** ➢ J.-C. Chevalier, C. Blanche Benveniste, M. Arrivé, J. Peytard, *Grammaire du français contemporain*, Paris, Larousse, 1997 (Larousse Références) ➢ Ch. Abbadie, B. Chevelon, M-H. Morsel, *L'expression française écrite et orale*, PUF de Grenoble, 1993 ➢ M.Saras, M. Stefanescu, *Gramatica practica a limbii franceze*, Bucuresti, Meteor Press, 2004 ➢ Aurelian Tanase, *Exercitii de gramatica franceza*, Bucuresti, Editura Stiintifica, 1964 ➢ Laura Anghel, *Exercitii de gramatica franceza*, II, Bacau, Editura Plumb, 1999
TEACHING METHODS	Theoretical course combined with interactive exercises in the seminary.

ASSESSMENT METHODS	
LANGUAGE OF INSTRUCTION	French

COURSE TITLE	**GERMAN**	CODE: L_1202

YEAR OF STUDY	I	SEMESTER	2	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	OC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR OF SCIENCE	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. ASSISTANT DELIA EŞIAN

OBJECTIVE OF THE COURSE	The course is meant to familiarize first-year students with basic notions of the German language. With the help of an interactive methodology, which allows students to ask questions and come up with their own comments and pieces of knowledge during lectures, the students are offered the necessary help to acquire a good understanding of the German language and give feedback to the lecturer.
PREREQUISITES	Romanian language.
COURSE CONTENTS	The course will include presentations of both German culture and German language with illustrative communicational situation examples selected mainly from the present day manuals and audio materials. The students will be confronted to everyday-situations of the german langauge culture. For tests, students shall make use of information acquired during lectures, as well as of data extracted from recommended bibliography.

RECOMMENDED READING	• *Studio D. Gesamtband 1-2. Kurs- und Arbeitsbuch. Einheit 1-12 – Europäischer Referenzrahmen A 1 (Lernmaterialien)* 2007. • CD: Studio D. Gesamtband 1. Kurs- und Arbeitsbuch. Einheit 1-12 – Europäischer Referenzrahmen A 1 (Lernmaterialien) 2007. • Paul Rusch, Helen Schmitz: *Einfach Grammatik. Übungsgrammatik Deutsch A1 bis B1*. Langenscheidt: Berlin/ München 2007.
TEACHING METHODS	lectures, workshops.

ASSESSMENT METHODS	homeworks; final tests, projects, interviews.
LANGUAGE OF INSTRUCTION	Romanian and German

COURSE TITLE	**CHEMICAL KINETICS**	CODE: CF2304

YEAR OF STUDY	II	SEMESTER	3	TYPE OF COURSE (CC-compulsory/OC-optional/EC-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PH. D. ASSOCIATE PROFESSOR ADRIAN BÎRZU

OBJECTIVE OF THE COURSE	To present the fundamental elements of chemical kinetics – formal kinetics, theories of chemical kinetics and the study of complex reacting systems, including solution reactions and catalytic reactions. The practical activities and seminars familiarize the students with the main methods used in kinetic studies of chemical systems.
PREREQUISITES	General chemistry. Mathematics.
COURSE CONTENTS	1. Fundamental concepts of chemical kinetics. 2. Reaction rate. 3. Kinetics of simple reactions. 4. Methods to evaluate fundamental kinetic parameters. 5. Experimental methods in chemical kinetics. 6. Theories of the reaction rates. 7. Complex reactions. 8. Catalytic kinetics. 9. Reactions in solution.

RECOMMENDED READING	1. A. Bîrzu, M. Dumitraş, *Cinetică chimică. Aspecte fundamentale*, MatrixROM, Bucureşti, 2008. 2. R. I. Masel, *Chemical Kinetics and Catalysis*, Wiley, 2001. 3. J. Steinfeld, J. Francisco, W. Hase, *Chemical Kinetics and Dynamics*, Prentice Hall, 1989. 4. K. A. Connors, *Chemical Kinetics*, VCH, 1990. 5. K. J. Laidler, *Chemical Kinetics*, Harper&Row, 1987. 6. M. R. Wright, *An introduction to chemical kinetics*, Wiley, 2004. 7. D. V. Roberts, *Enzyme kinetics*, Cambridge University Press 1977. 8. R. Copeland, *Enzymes*, Wiley, 2000. 9. V. Isac, A. Onu, C. Tudoreanu, Gh. Nemțoi, ,,*Chimie fizică. Lucrări practice"*, Editura Ştiința, Chişinău, 1995 10. J.C. Dechaux, L. Delfosse, A. Perche, J.P. Sawerysyn, ,,Problèmes de cinétique chimique avec solutions détaillées et rappels de cours", Masson, Paris, 1980.
TEACHING METHODS	Lecture

ASSESSMENT METHODS	2x25% of the final grade for two written tests from the seminar applications (weeks 7 and 15 of the semester), and 2x25% for two written exams from the content of the lectures (weeks 8 and 16).
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**CHEMISTRY OF S- AND P- BLOCK METALS**	CODE: CN2304

YEAR OF STUDY	II	SEMESTER	3	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR OF SCIENCE	5
NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. PROFESSOR ALEXANDRA RALUCA IORDAN

OBJECTIVE OF THE COURSE	To give insight into modern chemistry of metals of s- and p-bloks and enable the essential theoretical understanding of experimental results by highlighting the interplay between theory and practical applications. To give information about the occurance, preparation and production, physical and chemical properties of the studied elements, their most important compounds and utilization of the elements and their most important compounds To develop an understanding of the role of the chemist in synthesis of new compounds and study of their reactions.
PREREQUISITES	1. Fundamentals of chemistry 2. Fundamentals of inorganic chemistry
COURSE CONTENTS	1) General characteristics of non-transition and transition metals, crystal structure of metals, daltonides and berthollides, interstitial compounds and mixed crystals. 2) Alkali metals, hydrides, oxides, peroxides, hyperoxides, halogenides and hydroxides, oxoacids salts. 3) Group 13 (Be, Mg, Ca, Sr, Ba), hydrides, carbides, nitrides, oxides, halogenides, hydroxides, Grignard reagents. 4) Aluminium and its binary compounds, hydroxides and oxide-hydroxides. 5) Metals of groups 14 and 15 : Production, properties, compounds representative, uses

RECOMMENDED READING	1) Brezeanu, M., Cristoranu, E., Antoniu, A., Marinescu, D., Andruh, M., Chimia metalelor", Ed. Academiei Române, 1990. 2) .Calu, N., Berdan, I., Sandu, I., Chimie anorganică. Metale, vol. I şi II, Ed. I.P.Iaşi, 1987 3) Greenwood, N. N., Earnshaw, A., Chemistry of the Elements, Elsevier Ltd, Oxford, 2004.
TEACHING METHODS	Lectures, Collective problem solving

ASSESSMENT METHODS	Written examination (50%) and quizzes to assess practical skills (50%)
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**INSTRUMENTAL ANALYSIS I . PRACTICAL ABILITIES**	CODE CA2303

YEAR OF STUDY	II	SEMESTER	3	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	**CC**

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. LECTURER BÂRSĂNESCU ADRIANA

OBJECTIVE OF THE COURSE	The objectives of the course are as follows: - to understand the fundamental principles and concepts in electroanalytical chemistry; - to grasp the characteristics of the electrochemical methods that are presented, studying their possible application in different research fields; - to acquire analytical skills relevant to laboratory works in analytical chemistry.
PREREQUISITES	Fundamentals of analytical, anorganic and organic, chemistry.
COURSE CONTENTS	Introduction in instrumental analysis; Classification and basis of electroanalytical methods i.e. potentiometry, clasic polarography and voltamperometry, amperometric titration, conductometry, electrogravimetry and coulometry and their applications in analytical chemistry.

RECOMMENDED READING	1. C.Luca, Al.Duca, I.Al.Crişan, Chimie analitică şi analiză instrumentală, EDP, Buc., 1983. 2. Al.Duca, Al.Nacu, Cl.Calu, Chimie analitică şi analiză instrumentală, vol. III, I.P.Iaşi, 1980. 3. D.A.Skoog, Principles of instrumental Analysis 4 th, Ed. Sounders College Publishing, New York, 1992 4. D.Harvey, Modern Analytical Chemistry. The Mc Graw-Hill Companies, Inc., 2000. 5. Andrei Florin Dăneţ. Metode electrochimice de analiză, Ed.Stiinţifică, Bucureşti, 1996 6. L.Roman, R.Săndulescu, Metode de separare şi analiză instrumentală, EDP, Bucureşti, 1999
TEACHING METHODS	Lecture, laboratory, consultations.

ASSESSMENT METHODS	Writing examination
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**BIOCHEMISTRY**	CODE: CB2301

YEAR OF STUDY	II	SEMESTER	3	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. LECTURER GRADINARU VASILE ROBERT

OBJECTIVE OF THE COURSE	The objective of the lecture is to get to students the basic knowledges about simple biomolecules and their aplication in practice. Another aspect is to understand their physiological role in biochimical proceses. The last part is dedicated to metabolism of sugars, lipids, etc. We are expecting a continuos interaction with the students and to introduce a broad range of methods for teaching.
PREREQUISITES	Organic chemistry
COURSE CONTENTS	1. Aminoacids. 2. Carbohydrates 3. Lipids. 4. Water soluble and fat soluble vitamins 5. Sugar metabolism 6. Lipids metabolism 7. Aminoacids metabolism 8. Protein metabolism

RECOMMENDED READING	1. Fundamental of Biochemistry (2nd Edition)– Voet, D., Voet, J., Pratt, C. W. (2006). 2. Der Experimentator. *Proteinbiochemie/Proteomics* (5 Auflage)– Rehm, H. (2006). 3. Lehninger Principles of Biochemistry (2nd Edition)– Nelson, D. L., Cox, M. M. (2004). 4. Biochemistry (5nd Edition)– Berg, J.M., Tzmocyko, J.L., Stryer (2005). 5. Biochemie (Kompaktkurs), Universitatea Konstanz (Germania), Wendel, A. (2000). 6. Basiswissen Biochemie , (7 Auflage)–Loffler (2007). 7. Biochemistry (3rd Edition)- Mathews, C. K., van Holde, K. E., Ahern, K. G. (2000)
TEACHING METHODS	Narration, demonstrated examples, knowledges synthesis, exposion, discovery learning, conversation, description of some case studies, modeling

ASSESSMENT METHODS	The final exam is the form of written test, which contains question from aminoacid, carbohydrates, lipids, and protein metabolism. The time for the test is two hours, the grade are 1 to 10.
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**ENGLISH**	CODE: L_2305

YEAR OF STUDY	II	SEMESTER	3	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	OC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR OF SCIENCE	.5..

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. LECTURER LUCREȚIA CÂRLOANȚĂ

OBJECTIVE OF THE COURSE	• Skill of identifying types of written documents and texts, with their distinctive conventions and structures; • Skill of distinguishing between registers of English, and of reformulating text sequences in an acceptable way, both grammatically and communicatively; • Skill of writing documents and texts for authentic situations in everyday social praxis, in a correct and coherent English;
PREREQUISITES	English for Non-philological Studies, I and II Terms
COURSE CONTENTS	• Requirements for writing in English; coherence; • Stages and types of writing; defining and narrating; • Types of written business documents (report, memo, email); • The Job Application Package; • Writing Abstracts; • Essay Writing;

RECOMMENDED READING	• New Headway, Advanced, OUP, 2003; • Alexander L G and Catherine Wilson, In Other Words, Longman, 1978; • Selection from tasks included in the Course-pack-ul entitled Writing, envisaged by the Department of English through the Coordinator of Non-Philological English Studies and made available to students; • Thomson A J, Martinet A V, A Practical English Grammar, Exercises 1, Exercises 2, OUP, 1980;
TEACHING METHODS	Communicative and interactively practical, including strategies of team/group/pair work, simulation, information exchanges, recontextualization, dialogue;

ASSESSMENT METHODS	Continual assessment, midterm paper, individual study, final evaluation (written);
LANGUAGE OF INSTRUCTION	English

COURSE TITLE	**FRENCH**	CODE: L_2305

YEAR OF STUDY	II	SEMESTER	3	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	OC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PREP. DRD. IRINA DURDUREANU

OBJECTIVE OF THE COURSE	By the end of the module, the students will be able: ➢ To identify and use correctly the studied vocabulary and grammar items of the French language, orally as well as in writing, in contexts of authentic communication ➢ To understand better the French and Francophone culture and civilization items, in the context of the progress of the modern world ➢ To use the knowledge of the French language and the acquired communication competences for one`s personal development and for a better social and professional integration To commit oneself in the effort of learning the French language and of the self-evaluation.
PREREQUISITES	Previous study of French during college and during another year since the beginning of the faculty.
COURSE CONTENTS	***Themes:*** Language: • The Nominal Group: the Definite, Indefinite and Partitive Article. • The Verb: Revision of the Moods and Tenses - a Synthesis. • Sequence of Tenses in the Indicative Mood. • Use of *Si.* • The Degrees of Comparison of the Adjective and of the Adverb: comparative intra- and interlinguistic perspectives. • Past Participle Agreement. • The Pronoun. The Adverbial Pronouns *en* and *y*. • The Interrogative Construction. Communication and culture: *Crossed looks* • *Discovery activities: discovering the other, the group, oneself* • *On a trip* • *Political and administrative life* • *Religious holidays* Instruments: • The CV • Project writing • On the phone • Before a jury: the interview • Discourse, correspondence: saluting, congratulating, thanking, introducing a theme, proposing a solution

RECOMMENDED READING	**Bibliography:** ➢ J.-C. Chevalier, C. Blanche Benveniste, M. Arrivé, J. Peytard, *Grammaire du français contemporain*, Paris, Larousse, 1997 (Larousse Références) ➢ Ch. Abbadie, B. Chevelon, M-H. Morsel, *L'expression française écrite et orale*, PUF de Grenoble, 1993 ➢ M.Saras, M. Stefanescu, *Gramatica practica a limbii franceze*, Bucuresti, Meteor Press, 2004 ➢ Aurelian Tanase, *Exercitii de gramatica franceza*, Bucuresti, Editura Stiintifica, 1964 ➢ Laura Anghel, *Exercitii de gramatica franceza*, II, Bacau, Editura Plumb, 1999
TEACHING METHODS	Theoretical course combined with interactive exercises in the seminary.

ASSESSMENT METHODS	
LANGUAGE OF INSTRUCTION	French

COURSE TITLE	**GERMAN**	CODE: L_2305

YEAR OF STUDY	II	SEMESTER	3	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	OC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR OF SCIENCE	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. ASSIST. ANA-MARIA PALIMARIU

OBJECTIVE OF THE COURSE	The course is meant to deepen the fundamental acquaintances of the grammar of the German language the students have become familiar within the recent courses.
PREREQUISITES	
COURSE CONTENTS	- Fundamental notions of grammar (substantiv, article, adjective, numeral, pronoun, verb). - often used expressions in the communication and the application of the theoretical notions in concrete situations of communication; - informations about the culture, institutions, social relations and habits in Germany.

RECOMMENDED READING	Rudolf Hoberg/Ursula Hoberg, *Gramatica limbii germane*, Iaşi: Editura Polirom, 1996. Traducere şi adaptare de Octavian Nicolae. Heinz Griesbach/Dora Schulz, *Deutsche Sprache für Ausländer*, Ismaning: Max Hueber Verlag 1997. Ioan Lăzărescu, *Dicționar german-român/român-german pentru toți*, Bucureşti: Editura Niculescu, 2003 Octavian Nicolae, *Willkommen*. Manual de conversație în limba germana, Iaşi: Editura Polirom, 2005.
TEACHING METHODS	Exposition, exercises of translation, conversation.

ASSESSMENT METHODS	Homework; final (written) test.
LANGUAGE OF INSTRUCTION	German and Romanian

COURSE TITLE	**CHEMISTRY OF D-BLOCK METALS**	CODE: CN2405

YEAR OF STUDY	II	SEMESTER	4	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD ASSOCIATE PROFESSOR DUMITRU GÂNJU

OBJECTIVE OF THE COURSE	Students will be able to operate with the concepts of metallic state and function, understand the physical and chemical properties of main group metals and their compounds. Students will be able to do correlations between the structure and the physical and chemical properties.
PREREQUISITES	Chemistry of s- and p- block metals
COURSE CONTENTS	1. General Characterization Of Transitional Metals (Block "D") 2. General Study Of Coordination Compounds: Nature Of Metal Ligand Bond And General Properties 3. Study Of Transition Metals, Group IIIB, IVB, VB 4. Study Of Transition Metals, Group VIB, VIIB 5. Study Of Transition Metals, Group VIIIB 6. Study Of Transition Metals, Group IB, IIB 7. General Study Of Lantanides And Actinides

RECOMMENDED READING	1. N.Calu, I.Berdan, I.Sandu, „Chimie anorganică. Metale", vol. I şi II, Lit. I.P.Iaşi, 1987 2. Gh.Marcu "Chimia metalelor", Ed. Didactică şi Pedagogică, Bucureşti, 1979 3. P.Spacu şi colab., „Tratat de chimie anorganică", vol. III, Ed. Tehnică, Bucureşti, 1979 4. M.Brezeanu, El. Cristoranu, Ariana Antoniu, D.Marinescu, M.Andruh, „Chimia metalelor", Ed. Academiei Române, 1990 5. Greenwood, N. N., Earnshaw, A., Chemistry of the Elements, Elsevier Ltd, Oxford, 2004.
TEACHING METHODS	Lecturer, interactive teaching methods , case study

ASSESSMENT METHODS	Written examination
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**QUANTUM CHEMISTRY AND STRUCTURE**	CODE: CF2405

YEAR OF STUDY	II	SEMESTER	4	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PH.D. ASSOCIATE PROFESSOR IONEL HUMELNICU

OBJECTIVE OF THE COURSE	Ownership by students of the general principles of mechanics and quantum chemistry and application of quantum methods to study simple systems. Knowledge of the theoretical foundations of molecular structure and their use for deepen the nature of chemical bond and the chemical molecular properties. Theoretical determination of molecular structure and reactivity.
PREREQUISITES	Mathematics, General chemistry, Inorganic chemistry, Organic Chemistry, Thermodynamics Chemistry
COURSE CONTENTS	Elements of quantum mechanics. General formulation of quantum mechanics. Applications of quantum mechanics. The electronic spin theory in quantum mechanics. Approximate methods of quantum mechanics in quantum chemistry applicable. The nature of the chemical bond. Electronic states of diatomic molecule. Electronic structure and geometry of polyatomic molecules. Approximate methods of calculation (semiempiric) of the quantum chemistry. Elements of quantum theory of chemical reactivity.

RECOMMENDED READING	1. C. Ghirvu, „*Mecanică cuantică*", I. P. Iaşi, 1983 2. I.G. Murgulescu, „*Introducere în Chimia fizică - Atomi, molecule, legătura chimică*", vol. I, 1, Ed. Academiei Române, Bucureşti, 1976 3. I.G. Murgulescu, *Introducere în Chimia fizică - Structura şi proprietăţile moleculelor*, vol. I, 2, Ed. Academiei Române, Bucureşti, 1978 4. I. Humelnicu, Iuliana Voicu, C. Ghirvu, M. Constantinescu, "*Chimie cuantică - Aplicaţii generale şi probleme. Partea I – atomistică*", Editura Universităţii <Al.I. Cuza> Iaşi, 2004 5. P.W. Atkins, *Tratat de chimie fizică* - traducere, Ed. Tehnică Bucureşti, 1996 6. I. Humelnicu, *Elemente de chimie teoretică*, Ed. Tehnopress, Iaşi, 2003 7. C. Ghirvu, *Chimie fizică - Elemente de structură şi reactivitate moleculară*, I. P. Iaşi, 1979 8. C. Ghirvu, I. Humelnicu, "*Chimie cuantică - Aplicaţii generale şi probleme. Partea II – Structură moleculară*", Editura Universităţii <Al.I. Cuza> Iaşi, 2005.
TEACHING METHODS	PRESENTATION

ASSESSMENT METHODS	1. From the content of the lecture, there are two partial exams, in eighth and sixteen week of the semester, with 50% contribution of the final grade. 2. For the practical laboratory, there is an exam during the semester, counting for 50% of the final evaluation.
LANGUAGE OF INSTRUCTION	Roamanian

COURSE TITLE	**MATERIALS CHEMISTRY**	CODE:CM2401

YEAR OF STUDY	II	SEMESTER	4	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. PROFESSOR AURELIA VASILE

OBJECTIVE OF THE COURSE	Knowing the main types of available materials and advanced materials; Correlation between internal structure, properties, functions and possibilities of processing and performance of various types of materials; Techniques for obtaining nanostructured materials and their applications. Developing skills for study on materials and their applications.
PREREQUISITES	Inorganic chemistry, Organic chemistry
COURSE CONTENTS	Introduction: history materials, classification and materials cycle. I. Classes of materials; II. Properties of materials: mechanical, electrical, magnetic, dielectric / optical, thermal, resistance to environmental attack, biocompatibility; III. Metallic materials; IV. Polymeric materials, ceramic materials; V. Ceramic materials; VI. Composite materials; VII. Smart materials; VIII. Nanostructured materials. IX. Correct choice of materials for a particular use

RECOMMENDED READING	1. D. Constantinescu, D. I. Vaireanu, I. Maior, *Stiința materialelor*, MATRIX ROM, Bucureşti, 2004. 2. A. Vasile, N. Bâlbă, *Zeoliții în adsorbție*, Edit. Cermi, Iaşi, 2000. 3. Gh. Pop, M. Chiriță, Monica Pop Rostami, *Materiale bioceramice*, Edit. Tehnopress, Iaşi, 2003. 4. M. Petrescu, M. I. Petrescu, M. Călin, N. Petrescu, *Metals, ceramics and polymers Structure. Transformations, Crystallography*, Editura UPB, Bucureşti, 2000. 5. G. Cao, *Nanostructures and Nanomaterials, Synthesis, Properties and Applications*, Imperial College Press, 2004. 6. D. Bunea, A. Nocivin, *Materiale biocompatibile*, Editura Bren, Bucuresti, 1998.
TEACHING METHODS	Type classes will be interactive lecture using PowerPoint presentation of information accompanied by a large number of images suggestive themes lecture.

ASSESSMENT METHODS	Final score	50% continuous assessment seminar 50% final assessment course
	Course score	50% Assessment week 8: written exam 50% Assessment week16: written exam
	Terms	Minimum score for each form of assessment is 5
	Criteria	Achieving minimum performance standards of discipline.
	Forms	Written exam
LANGUAGE OF INSTRUCTION	Romanian language	

COURSE TITLE	**INSTRUMENTAL ANALYSIS**	CODE: CA2404

YEAR OF STUDY	II	SEMESTER	4	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	**CC**

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PhD. PROFESSOR DULMAN VIORICA

OBJECTIVE OF THE COURSE	The student should obtain information about fundamentals and applications of the optical methods of analysis for new methods and instruments. . Students must be able to understand the methods, both theoretical and experimental for quantitative analysis.
PREREQUISITES	Fundamentals of analytical chemistry, physics, mathematics, organic and inorganic chemistry
COURSE CONTENTS	Absorbtion spectroscopy : molecular (IR, UV-VIZ) and atomic (FAAS, ETAAS). Emission spectroscopy : molecular (foto luminiscence and chemiluminiscence) and atomic (flame, plasma, arc and spark atomization). Miscellaneous optical methods (nephelometry, turbidimetry) and others methods.

RECOMMENDED READING	7. C.Luca, Al.Duca, I.Al.Crişan, Chimie analitică şi analiză instrumentală, EDP, Buc., 1983. 8. Al.Duca, Al.Nacu, Cl.Calu, Chimie analitică şi analiză instrumentală, vol. III, I.P.Iaşi, 1980. 9. D.A.Skoog, Principles of instrumental Analysis 4 th, Ed. Sounders College Publishing, New York, 1992 10. D.Harvey, Modern Analytical Chemistry, The McGraw-Hill Companies, Inc., 2000. 5. I.Gh.Tănase, Tehnici şi metode electrochimice de analiză, Ed.Ars.Docendi, Bucureşti, 2000. 4. Andrei Florin Dăneț. Metode electrochimice de analiză, Ed.Stiințifică, Bucureşti, 1996. L.Roman, R.Săndulescu, Metode de separare şi analiză instrumentală, EDP, Bucureşti, 1999
TEACHING METHODS	Lecture

ASSESSMENT METHODS	Written examination
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**ENGLISH**	CODE: L_2406

YEAR OF STUDY	II	SEMESTER	4	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	OC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR OF SCIENCE	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. LECTURER LUCREȚIA CÂRLOANȚĂ

OBJECTIVE OF THE COURSE	• skill of efficient interaction in oral communication both in different socio-professional situations/contexts, and in plenary; • skill of diversifying strategies for verbal and non-verbal communication, with sensitivity to cultural variables; • skill of translating in Chemistry; • skill of acquiring specialized vocabulary and of re-/contextualizing it; • skill of delivering an oral presentation on a specialized topic in plenary;
PREREQUISITES	• English for Non-Philological Studies, I and II Terms; • Written Communication in English;
COURSE CONTENTS	• Principles of Efficient Oral Communication; Chemistry and the Human Body; • Meetings; some Cultural Variables; Specialized praxis; • Oral presentations; specialized praxis; • Visual resources in oral presentations; specialized praxis; • Interviewing; specialized praxis; • International Communication; specialized praxis;

RECOMMENDED READING	• Becker L., Presentation Skills for Students, Palgrave Macmillan, 2004; • Hartley P., Interpersonal Communication, 1998; • Holden S., Communication, Macmillan Education, London, 2006; • Viney, K., and P Viney, Handshake: A Course in Communication, OUP, 1996; • Thomson A J. And Martinet A V., A Practical English Grammar, Exercises 1,2, OUP, 1980; Galea, I., and Virgil Stanciu, English with Tears, Cluj, Dacia, 1999;
TEACHING METHODS	Communicatively –interactive, with strategies of team/pair/individual work, simulations, debates, project in plenary

ASSESSMENT METHODS	Continual assessment, midterm evaluation, project, individual study, final evaluation;
LANGUAGE OF INSTRUCTION	English

COURSE TITLE	**FRENCH**	CODE: L_2406

YEAR OF STUDY	II	SEMESTER	4	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	OC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR (BEGINNERS)	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PREP. DRD. IRINA DURDUREANU

OBJECTIVE OF THE COURSE	By the end of the module, the students will be able: ➢ To identify and use correctly the studied vocabulary and grammar items of the French language, orally as well as in writing, in contexts of authentic communication ➢ To understand better the French and Francophone culture and civilization items, in the context of the progress of the modern world ➢ To use the knowledge of the French language and the acquired communication competences for one`s personal development and for a better social and professional integration To commit oneself in the effort of learning the French language and of the self-evaluation.
PREREQUISITES	Previous study of French during college and during another year since the beginning of the faculty.
COURSE CONTENTS	***Themes:*** Language: • The Nominal Group: the Definite, Indefinite and Partitive Article. • The Verb: Revision of the Moods and Tenses - a Synthesis. • Sequence of Tenses in the Indicative Mood. • Use of *Si.* • The Degrees of Comparison of the Adjective and of the Adverb: comparative intra- and interlinguistic perspectives. • Past Participle Agreement. • The Pronoun. The Adverbial Pronouns *en* and *y.* • The Interrogative Construction. Communication and culture: *Crossed looks* • *Discovery activities: discovering the other, the group, oneself* • *On a trip* • *Political and administrative life* • *Religious holidays* Instruments: • The CV • Project writing • On the phone • Before a jury: the interview • Discourse, correspondence: saluting, congratulating, thanking, introducing a theme, proposing a solution

RECOMMENDED READING	**Bibliography:** ➢ J.-C. Chevalier, C. Blanche Benveniste, M. Arrivé, J. Peytard, *Grammaire du français contemporain*, Paris, Larousse, 1997 (Larousse Références) ➢ Ch. Abbadie, B. Chevelon, M-H. Morsel, *L'expression française écrite et orale*, PUF de Grenoble, 1993 ➢ M.Saras, M. Stefanescu, *Gramatica practica a limbii franceze*, Bucuresti, Meteor Press, 2004 ➢ Aurelian Tanase, *Exercitii de gramatica franceza*, Bucuresti, Editura Stiintifica, 1964 ➢ Laura Anghel, *Exercitii de gramatica franceza*, II, Bacau, Editura Plumb, 1999
TEACHING METHODS	Theoretical course combined with interactive exercises in the seminary.

ASSESSMENT METHODS	
LANGUAGE OF INSTRUCTION	French

COURSE TITLE	**GERMAN**	CODE: L_2406

YEAR OF STUDY	II	SEMESTER	4	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	OC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR OF SCIENCE	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. ASSIST. ANA-MARIA PALIMARIU

OBJECTIVE OF THE COURSE	The course is meant to deepen the fundamental acquaintances of the grammar of the German language the students have become familiar within the recent courses.
PREREQUISITES	
COURSE CONTENTS	- Fundamental notions of grammar (substantiv, article, adjective, numeral, pronoun, verb). - often used expressions in the communication and the application of the theoretical notions in concrete situations of communication; - informations about the culture, institutions, social relations and habits in Germany.

RECOMMENDED READING	Rudolf Hoberg/Ursula Hoberg, *Gramatica limbii germane*, Iaşi: Editura Polirom, 1996. Traducere şi adaptare de Octavian Nicolae. Heinz Griesbach/Dora Schulz, *Deutsche Sprache für Ausländer*, Ismaning: Max Hueber Verlag 1997. Ioan Lăzărescu, *Dicționar german-român/român-german pentru toți*, București: Editura Niculescu, 2003 Octavian Nicolae, *Willkommen*. Manual de conversație în limba germana, Iaşi: Editura Polirom, 2005.
TEACHING METHODS	Exposition, exercises of translation, conversation.

ASSESSMENT METHODS	Homework; final (written) test.
LANGUAGE OF INSTRUCTION	German and Romanian

COURSE TITLE	**CHEMISTRY OF COORDINATION COMPOUNDS**	CODE: CA3509

YEAR OF STUDY	III	SEMESTER	5	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PROFESSOR PHD. AUREL PUI

OBJECTIVE OF THE COURSE	Developing skills for students to apply theoretical principles and experimental techniques for synthesis, separation and determination of the structure, properties and reactivity of the coordinative compounds.
PREREQUISITES	Inorganic chemistry (metals), Structure.
COURSE CONTENTS	Formation, stability and nomenclature of the coordinative compounds. Classification, isomeric and stereochemistry of the coordinative compounds. Concepts of molecular symmetry. Link theories of metal-ligand. Absorption spectra of coordinative compounds (UV-VIZ, IR spectroscopy,) Magnetic and electric properties of coordinative compounds. Reactivity of the coordinative compounds.

RECOMMENDED READING	1. A. Pui, D. G. Cozma, *Bazele chimiei compuşilor coordinativi*, Ed. Matrix Rom, Bucureşti, 2003. 2. Sidney Kettle, *Symetrie et structure: theorie des grupes en chimie*, Ed. Masson, Paris, 1997. 3. Alan Vincent, *Molecular simetry and group theory*, 2nd Edition, John Wiley and Sons, Ltd, 2001. 4. K. Najamoto, *Infrared and Raman Spectra of Inorganic and Coordination compounds*, 5th Edition, John Wiley and Sons, Ltd, 1997. 5. A.B.P. Lever, *Inorganic Electronic Spectroscopy*, Elsevier, Amsterdam, 1968. 6. Gh. Marcu, *Chimia compuşilor coordinativi*, Ed. Academiei Romane, 1984. 7. M. Brezeanu, E. Cristurean, A. Antoniu, D. Marinescu, M. Andruh, *Chimia metalelor*, Ed. Academiei, 1990. 8. Aurel Pui, Dănuț Gabriel Cozma, Ioan Berdan, *Lucrări practice de Chimia Compuşilor Coordinativi*, Ed. Universității "Al.I.Cuza" Iaşi, 2001. 9. Derek Woollins, *Inorganic Experiments*, VCH Verlagsgessellschaft mbH, D-69451, Weinheim, Federal Republic of Germany, 1994.
TEACHING METHODS	Lecture course, seminar and laboratory.

ASSESSMENT METHODS	Writing examen (25+25%) + seminar and laborator 50%).
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**ELECTRTOCHEMISTRY**	CODE: CF3507

YEAR OF STUDY	III	SEMESTER	5	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PhD. PROFESSOR GHEORGHE NEMȚOI

OBJECTIVE OF THE COURSE	Modern electrochemistry cannot be properly conceived withuout the understanding of the principles of electrochemical kinetics and of the structure of electrode-solution interfaces. A basic knowledge of the thermodynamics of the electrochemical systems is quite important. In order to understand the principles governing the work function of such practically important systems as batteries, fuel cells, corrosion and corrosion protection, electrolysis systems as well as membranes and biomembranes, the chimists they must learn the basics of interfacial structure, electrochemical kinetics and transport processes. Another objective of the course could also be seen as a part of heterogeneous reactions and catalysis in general. In this respect, one should not forget that there are a lot of jobs requesting chemists with a good basic knowledge of how an electrochemical cell works.
PREREQUISITES	Physics-electricity, Analitical Chemistry, Physical Chemistry, Algebra and Analytical Mathematics
COURSE CONTENTS	Ionic structure of the electrolytes. Ionization equilibria, pH, buffer solution. Thermodynamics of ions in solution, the activity concept in electrolyte solution, the Debye-Huckel theory. Conduction and conductivity in electrolytes. Transport number and mobilities. Thermodynamic equilibrum in an electrochemical cell. Galvanic cells. Electrode potentials and the SHE scale. The Nernst equation. Types of reversible electrodes. The relations between equilibrum potential and other thermodynamic measures. Primary and secondary batteries, fuel cells. Faraday's laws of electrolysis. Overpotentials and current-potentials curves. Electroanalysis. The basics of electrochemical corrosion and corrosion protection.

RECOMMENDED READING	1. Gh. Nemțoi, V. Isac, Chimie fizică-Electrochimie, Editura Ştiința, Chișinău, 1997; 2. I.G. Murgulescu, O.M. Radovici, Introducere în chimie fizică, vol.IV, Electrochimie, Editura Academiei Române, Bucureşti, 1986; 3.Gh. Nemțoi, Introducere în electrochimie prin aplicații numerice, Editura "Tipo" Moldova, Iaşi, 2001; 4.P.W.Atkins, C.A.Trapp, Exercitii si probleme rezolvate de chimie fizica, Ed.tehnica Bucuresti,1997(trad.); 5.L. Oniciu, E. Constantinescu, Electrochimie şi coroziune, Editura Didactică şi Pedagogică, Bucureşti, 1982; 6.A. N. Frumkin, B. B. Damaschin, Modern Aspect of Electrochemistry, vol. 3, Editor J. O. M. Bockris Butterworth, London, 1964; 7.IUPAC, Mărimi, unități şi simboluri în chimia fizică, Editura Academiei Române, Bucureşti, 1996.
TEACHING METHODS	Heuristic method used as main teaching method in explanatory part. Training the students to stock the new knowledge and algorithmic method for its application.

ASSESSMENT METHODS	Average mark: 50% (40-60%) Continuous evaluation at laborations 50% (60-40%) Final evaluation of the knowledge from course notions Final course average mark: 50% Evaluation in the 8th week 50% Evaluation in the 16th week Admission conditions: Minimal average mark for each evaluation form is 5 Criteria: Achievement of the minimal performance standards corresponding to the discipline Examination forms: written work evaluation based on the course information
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**HETEROGENEOUS CATALYSIS**	CODE: CF3508

YEAR OF STUDY	III	SEMESTER	5	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. LECTURER ASAFTEI IULIEAN -VASILE

OBJECTIVE OF THE COURSE	- To assimilate the knowledge of catalysis and catalytically process. - To assimilate the preparation, characterization and the critical rolls of the catalysts in the chemical process;
PREREQUISITES	Chemical Technology , Materials Chemistry, ,Physical Chemistry, Kinetic, Organic and inorganic Chemistry
COURSE CONTENTS	- Catalysis, catalysts, promoters, etc., - The steps of the heterogeneous catalytically process; - Preparation and characterization of the heterogeneous catalysts,

RECOMMENDED READING	I. I. Asaftei, N. Bilba, Gh. Iohcea, *Elemente de Cataliza*, , Editura Cermi, Iasi, 2002. II. E.Segal, C. Iditoiu, N. Doca, D. Fatu, *Cataliza si catalizatori*, Editura Facla,, Timisoara, 1986. III. Ch. Satterfield, *Heterogeneous Catalysis in Practice*,Mc. Graw/Hil, 1980.
TEACHING METHODS	Oral presentation. Laboratory works

ASSESSMENT METHODS	Written and oral examination
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**RADIOCHEMISTRY**	CODE: CA3510

YEAR OF STUDY	III	SEMESTER	5	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. ASSOCIATE PROF. KARIN POPA

OBJECTIVE OF THE COURSE	To familiarise with the specific language of radiochemistry. To acquire a due knowledge of basic aspects of radiochemistry. To open the interest for radiochemistry as a fundamental science. To be familiarized with the practical aspects of radiochemistry.
PREREQUISITES	General Inorganic Chemistry, Metals.
COURSE CONTENTS	Introduction to Radiochemistry. Periodic system, stable and radioactive nuclides. Radioactivity and evolution of nuclear theory. Force in matter and subatomic particles. Nuclides and natural decay chains. Segre' map of the isotopes. Nuclear chemistry and mass energy relationships (nuclear structure). Properties of the nucleus, nuclear forces, nuclear particles and decay rules. The nuclear structure, Rutherford's discovery of the nucleus. Models of the nucleus. Types of radioactive decay: Radioactive nuclides. α, β- and γ- decays. K-capture/electron capture. Branching decays and decay schemes. Interaction/ effect of radiation with matter. Units of radiation. Models of interaction, ion-pair concept. Effect of ionizing radiations on man, concept of permissible dose to individual organs. Radioactive protection. Nuclear reactions: mechanisms and models. Nuclear reaction: mechanisms and models. Theory of decay and types of nuclear reactions. Energetic of nuclear reactions. Special nuclear reactions; nuclear fusion, nuclear fission (mechanism, fission products). Nuclear technology. Nuclear reactors. Nuclear fuel cycles. Management of radioactive waste. Waste management. Waste minimization. Treatment of waste. Partitioning and transmutation. Conditioning of nuclear waste. Waste disposal.

RECOMMENDED READING	(1) S.A. Cotton, 'Lanthanides and Actinides', MacMillan, London, 1991. (2) J. Tolgzessz, E. Bujdoso, 'Handbook of Radioanalytical Chemistry', CRC Press, 1991. (3) G. Chopin, J. Rydberg, J.O. Liljenzin 'Radiochemistry and Nuclear Chemistry', Butterwoth-Heinemann, New York, 1995. (4) C.H. Oh, 'Hazardous and radioactive waste treatment technologies handbook', CRC Press, Boca Raton, 2001. (5) K. Popa, D. Humelnicu, Al. Cecal, 'Radioactivitatea mediului înconjurător', ed. MatrixRom, Bucuresti, 2005. (6) A. Vertes, S. Nagy, Z. Klenecsar, 'Handbook of nuclear chemistry', Kluwer Academic Publishers, Dordrecht, 2003.
TEACHING METHODS	Classroom lectures. Seminars. Laboratory sessions. Homework.

ASSESSMENT METHODS	Exam
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**REACTION MECHANISMS IN INORGANIC CHEMISTRY**	CODE: CA3612

YEAR OF STUDY	III	SEMESTER	5	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. LECTURER CORNEI NICOLETA

OBJECTIVE OF THE COURSE	- increase of the students knowledge about the structure of inorganic substances and their reactivity - developments provide a chemical process by specifying the positions and active study of reaction mechanisms - application of the concepts of thermodynamics and kinetics in evolution of chemical processes with the participation of inorganic species
PREREQUISITES	Fundamentals of inorganic chemistry Nonmetal chemistry Metals chemistry
COURSE CONTENTS	1. The physical-chemical parameters of the atoms in ionic and covalent structures. The reactivity of the inorganic compounds. 2. Classification of inorganic reactions. Aspects of thermodynamic and kinetic reactivity of inorganic substances. 3. Protolitic reactions. Reaction mechanisms 4. Mechanisms of redox reactions 5. Reaction mechanism in the formation of coordinative compounds 6. Reactivity of the coordinative compounds. Reaction mechanisms

RECOMMENDED READING	1. I.Berdan, "Reactivitate şi mecanisme de reacție în chimia anorganică", Ed. Univ."Al.I.Cuza" Iaşi, 2006 2. D. Katakis, G.Gordon, "Mechanisms of Inorganic Reactions", John-Willey, 1987 3. R. Jordan, "Mechanismen anorganischer und metallorganischer Reaktionen, ",Teubner Stuttgart, 1994 4. C. Janiac, T.M. Klapoetke, H.-J. Meyer, "Moderne Anorganische Chemie", de Gruyter, 2003
TEACHING METHODS	Lecture, demonstration, experiment

ASSESSMENT METHODS	Oral and written evaluation, during laboratory (50 %) Written, final evaluation (50 %)
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**MACROMOLECULAR CHEMISTRY**	CODE: CO3507

YEAR OF STUDY	III	SEMESTER	5	TYPE OF COURSE (CC-compulsory/OC-optional/EC-elective)	CC

LEVEL OF COURSE	NUMBER OF ECTS CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	ASSOC. PROFESSOR. PH.D. NECULAI – CĂTĂLIN LUNGU

OBJECTIVE OF THE COURSE	Transmitting to the students the main knowledge of the macromolecular chemistry. Describing the fundamental elements of synthesis and characterizations of macromolecular compounds using the results of organically chemistry. Creating the ability of the students to understand the macromolecular chemistry's processes. At the end of this course the students must be able to apply this knowledge in the practical domains of macromolecular chemistry.
PREREQUISITES	Organically Chemistry, Synthesis of Organically Compounds
COURSE CONTENTS	- Generalities about macromolecular chemistry. - General considerations about principles of macromolecular synthesis. - Modalities of synthesis of polymers during chained mechanism, polymerizations of unsaturated compounds: radically, cationic and anionic polymerizations. - Polycondensations during on stages mechanism. - Others procedures to obtain the polymers: polyadition for polyurethanes and polyureas, polymerization of (hetero)cyclic compounds, no classically methods of polymer's synthesis. - Chemical transformations of macromolecular substances.

RECOMMENDED READING	1. C. I. Simionescu, C. Vasiliu-Oprea, V. Bulacovschi, B. Simionescu şi C. Negulianu – Chimie macromoleculară - Editura Didactică şi Pedagogică, Bucureşti, 1985. 2. C. I. Simionescu şi I. I. Negulescu – Tratat de chimia compuşilor macromoleculari, Vol. IV – Editura Academiei, Bucureşti, 1993. 3. N. Asandei, V. Bulacovschi, M. Nicu, M. Dărângă, M. Ivănoiu şi C. Mihăilescu – Fizico-chimia polimerilor, Sinteze – Analize – Caracterizare – Editura "Gh. Asachi" Iaşi, 1995. 4. Gh. Surpățeanu – Chimie Macromoléculaire – Les Presses de l'Université „Littoral Côte d'Opale" Dunkerque, France, 2003. 5. M. Fontanille et Y. Gnanou – Chimie et physico-chimie des polyméres – Dunod Éditeur, Paris, 2002. 6. J. Prud'homme et R. E. Prud'homme – Synthèse et caractérisation des macromolécules. Manuel de travaux pratiques - Les Presses de l'Université de Montréal, 1981.
TEACHING METHODS	Oral and writing presentation and seminarisation. Working in laboratory of macromolecular chemistry.

ASSESSMENT METHODS	Conditions: - a full activity in laboratory and cours, - minim 5 for laboratory activity. Criteria: - the results obtained in respective semester. Forms: - writing and /or oral presentation. Final grade calculation: 40 % semestrial seminar and laboratory activity, plus 60 % examen note (30 % first sesion, plus 30 % second sesion).
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**STRUCTURAL ORGANIC ANALYSIS**	CODE: CO3606

YEAR OF STUDY	III	SEMESTER	6	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. LECTURER RAMONA ANTOANETA DANAC

OBJECTIVE OF THE COURSE	Understanding and utilization of mass spectrometry, NMR and IR spectroscopy as a tool for the solution of various structural problems of the organic compounds.
PREREQUISITES	Fundamentals of organic chemistry Chemistry of hydrocarbons and single functional group compounds Organic chemistry of multiple functional group compounds
COURSE CONTENTS	**Chemical methods**: Reactions for the identification, separation and dosing of the compounds with different functional groups. **Physical methods:** *Mass spectroscopy*: introduction and theory. Instrumentation. Predictions of bond fission. Types of ions. Interpretation of mass spectra of some chemical classes of organic compounds. ^{1}*H-NMR Spectroscopy*: Introduction and theory. Instrumentation. Chemical Shift. Spin-spin coupling. Application of NMR-spectroscopy in organic chemistry. *IR spectroscopy:* Applications of IR spectroscopy on some chemical classes of organic compounds.

RECOMMENDED READING	1. E. de Hoffmann, V. Stroobant, Mass Spectrometry. Principles and Applications (3rd edition), John Wiley & Sons, Ltd, 2007. 2. R. M. Silverstein, F. X. Webster, D. J. Kiemle, Spectrometric Identification of Organic Compounds (7th edition), John Wiley & Sons, Ltd, 2007. 3. H. Friebolin, Basic One- and Two-Dimensional NMR Spectroscopy (4th edition), Wiley VCH, 2005. 4. J.R. Hanson, Functional Group Chemistry, Wiley-Interscience, 2002. 5. Ioan Druta, Stabilirea structurii compusilor organici, 1987. 6. F. Albert, N. Barbulescu, C. Holszky, C. Greff, Analiza chimica organica. Editura tehnica, Bucuresti, 1970. 7.R. Danac, M. Roman, Probleme de analiza structurala organica, Ed Sedcomlibris, 2006, Iasi.
TEACHING METHODS	Lecture, conversation, demonstration

ASSESSMENT METHODS	Examination during semester, writing, oral at request
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**TRACE ANALYSIS**	CODE: CA3611

YEAR OF STUDY	III	SEMESTER	6	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	LECTURER PHD. CECILIA ARSENE

OBJECTIVE OF THE COURSE	**Cognitive / learning** Knowledge on correct differentiation between major, trace and ultra-trace level components, macro/ultra-micro components. Understanding of the basic principles for an appropriate identification of a preconcentration method. **Skills** Practical skills to identify and quantify a chemical component at traces level.
PREREQUISITES	Base of analytical chemistry, Instrumental analyses.
COURSE CONTENTS	Issues in the chemical analysis of trace components. Standard operating procedures in chemical analysis of trace components. Identification of performance characteristics for methods used to quantify trace components. Methods for identification and quantification in analyzing trace components and uncertainties involved. Extraction as a method to eliminate the possible undesirable interference from a complex chemical matrix. Extraction of the liquid phase.

RECOMMENDED READING	1. Guidelines for drinking water quality. Volume I. Recommendations, Published on behalf of World Health Organization, 2006. 2. Comprehensive analytical chemistry, ed. D. Barcelo, Modern instrumental analysis (vol. 47), Ahuja, S., Jespersen, N., eds., Elsevier, 2006. 3. Environmental monitoring and characterisation, J.F. Artiola, I.L. Pepper, M.L. Brusseau, Elsevier, 2004. 4. Environmental chemistry. A global perspective, G.W. Van Loon, S.J. Duffy, Oxford Univ. Press Inc., 2000. 5. Encyclopaedia of analytical chemistry, ed. R.A. Meyers, John Wiley – Sons, Chicester, 2000. 6. Environmental Chemistry: A Global Perspective, G.W. van Loon, S.J. Duffy, Oxford University Press, 2000. 7. Harvey, D., Modern analytical chemistry, Mac Graw Hill, 2000. 8. Analytical chemistry, Kellner, R., Mermet, J.M., Otto, M. and Widmer, H.M., eds., Wiley-VCH, Verlag, Germany, 1998.
TEACHING METHODS	Lecture, demonstration and direct practical applications.

ASSESSMENT METHODS	Discipline note	50% continue to laboratory and / or seminar 50% score course evaluation
	Course evaluation score	50% score evaluation in week 8th 50% score evaluation in week 16th
	Terms	Making full laboratory work and promote the final test given at the laboratory. Minimum score for each form of assessment is 5.
	Criteria	Achieving minimum performance standards related with discipline.
	Type	Written exam.
LANGUAGE OF INSTRUCTION	Romanian	

COURSE TITLE	**THE CHEMISTRY OF ORGANOMETALLIC COMPOUNDS**	CODE: CO3608

YEAR OF STUDY	III	SEMESTER	6	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. LECTURER GHEORGHIȚĂ ZBANCIOC

OBJECTIVE OF THE COURSE	The course, The Chemistry of Organometallic Compounds, addresses to the students from the 3rd year, in order to thorough going study the knowledge concerning the organic compounds at the metals from main groups and the applications of these in organic synthesis.
PREREQUISITES	Bases of Organic Chemistry Metallic Chemistry Chemistry of Coordinative Compounds
COURSE CONTENTS	1. Introduction of organometallic compounds. 2. 18 Electron "Rule" 3. The structure and the bonding of organometallic compounds from the main groups. 4. The synthesis methods of organometallic compounds. 5. The stability of organometallic compounds of typical elements. 6. Type of reaction. 7. Organic compounds of metals from group 1. 8. Organic compounds of metals from group 2. 9. Organic compounds of metals from group 12. 10. Organic compounds of metals from group 13. 11. Organic compounds of metals from group 14.

RECOMMENDED READING	1. G.L. Miessler, D.A. Tarr, Inorganic Chemistry, Prentice Hall Inc., USA, 1991 2. C. Guran, Organometallic Chemistry, Ed. UPB, 1994. 3. G.L. Miessler, D.A. Tarr, Inorganic Chemistry, Prentice Hall Inc., USA, 1991. 4. R.H. Crabtree,The organometallics chemistry of the transition metals, Fourth Edition, Wiley-Interscience, 2005.
TEACHING METHODS	The teacher will present the material in 2 hours of week. He will explain the material using traditional and modern methods by using of the blackboard or the video projector.

ASSESSMENT METHODS	Exam, colloquium, periodical papers.
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**PHYSICAL CHEMISTRY OF INSTERFACES AND POLYMERS**	CODE: CF3609

YEAR OF STUDY	III	SEMESTER	6	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. LECTURER MIHAI DUMITRAŞ

OBJECTIVE OF THE COURSE	The students will acquire specific knowledge referring to fundamental notions in the area of disperse systems, their specific and non-specific properties, stabilization and destruction of colloids, as well as knowledge on the interdependence between the nature and properties of the polymers and their specific applications. They will also receive training in order to be able to work out, from both a theoretical and from an experimental point of view, a scientific study in the field of colloidal and polymeric science.
PREREQUISITES	Mathematics, Chemical thermodynamics, Chemical kinetics
COURSE CONTENTS	1. Fundamental notions on disperse systems. Particle size and shape, distribution functions, disperse analysis. Preparation and purification of disperse systems. 2. Non-specific properties. Transport phenomena, optical properties. Sedimentation analysis. 3. Specific and interfacial area related properties. Superficial phenomena. 4. Adsorption phenomena. Homogeneous and heterogeneous adsorption. Adsorption isotherms. 5. Electrokinetic phenomena. Electrical double layer. Electroosmosis and electrophoresis. The flow and sedimentation potential. 6. Stability and destruction of colloidal systems. Electrostatic and steric stabilization. Coagulation and flocculation. 7. Average molecular mass in polymeric systems. Polydispersity. Distribution functions. Methods of fractionation. 8. Thermodynamics of polymer solutions. Entalpy and entropy of dissolution. Gibbs energy of mixing. Flory-Huggins theory. 9. Colligative properties of polymer solutions. Determination of the average molar mass. 10. Structural-thermodynamic parameters of polymers. Methods of determination. 11. Viscosity of polymer solutions. Applications. 12. Phase states and transitions. Applications.

RECOMMENDED READING	1. R.J. Hunter, „Foundations of Colloid Science”, Clarendon Press, Oxford, 1993 2. E. Chifu, ,,Chimia coloizilor şi a interfeţelor”, Presa Universitară Clujeană, Cluj-Napoca, 2000 3. D. Myers, „Surfaces, Interfaces and Colloids: Principles and Applications”, 2nd Edition, John Wiley & Sons, Inc., 1999 4. I. Mîndru, M. Leca "Chimia macromoleculelor si coloizilor", Ed. Did. şi Pedagogică, Bucureşti, 1977 5. M. Leca, „Chimia fizică a macromoleculelor”, Ed. Univ. Bucureşti, 1998 6. A. Onu, „Chimia fizică a stării macromoleculare”, Ed.Tehnopress, Iaşi, 2002
TEACHING METHODS	Exposition, demonstration, conversation, experimental work, problem solving.

ASSESSMENT METHODS	Tests during the semester, exam at the end of the semester.
LANGUAGE OF INSTRUCTION	ROMANIAN

COURSE TITLE	**MATERIALS CHEMISTRY**	CODE:CF3613

YEAR OF STUDY	III	SEMESTER	6	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. PROFESSOR AURELIA VASILE

OBJECTIVE OF THE COURSE	Knowing the main types of available materials and advanced materials; Correlation between internal structure, properties, functions and possibilities of processing and performance of various types of materials; Techniques for obtaining nanostructured materials and their applications. Developing skills for study on materials and their applications.
PREREQUISITES	Inorganic chemistry, Organic chemistry
COURSE CONTENTS	Introduction: history materials, classification and materials cycle. I. Classes of materials; II. Properties of materials: mechanical, electrical, magnetic, dielectric / optical, thermal, resistance to environmental attack, biocompatibility; III. Metallic materials; IV. Polymeric materials, ceramic materials; V. Ceramic materials; VI. Composite materials; VII. Smart materials; VIII. Nanostructured materials. IX. Correct choice of materials for a particular use

RECOMMENDED READING	1. D. Constantinescu, D. I. Vaireanu, I. Maior, *Stiința materialelor*, MATRIX ROM, Bucureşti, 2004. 2. A. Vasile, N. Bâlbă, *Zeoliții în adsorbție*, Edit. Cermi, Iaşi, 2000. 3. Gh. Pop, M. Chiriță, Monica Pop Rostami, *Materiale bioceramice*, Edit. Tehnopress, Iaşi, 2003. 4. M. Petrescu, M. I. Petrescu, M. Călin, N. Petrescu, *Metals, ceramics and polymers Structure. Transformations, Crystallography*, Editura UPB, Bucureşti, 2000. 5. G. Cao, *Nanostructures and Nanomaterials, Synthesis, Properties and Applications*, Imperial College Press, 2004. 6. D. Bunea, A. Nocivin, *Materiale biocompatibile*, Editura Bren, Bucuresti, 1998.
TEACHING METHODS	Type classes will be interactive lecture using PowerPoint presentation of information accompanied by a large number of images suggestive themes lecture.

ASSESSMENT METHODS	Final score	50% continuous assessment seminar 50% final assessment course
	Course score	50% Assessment week 8: written exam 50% Assessment week16: written exam
	Terms	Minimum score for each form of assessment is 5
	Criteria	Achieving minimum performance standards of discipline.
	Forms	Written exam
LANGUAGE OF INSTRUCTION	Romanian language	

COURSE TITLE	**BIOINORGANIC CHEMISTRY**	CODE: CA3613

YEAR OF STUDY	III	SEMESTER	6	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	LECTURER PH.D. MONICA TOMA

OBJECTIVE OF THE COURSE	- To understand elementary concepts of bioinorganic chemistry and how these explain the biological activity - To establish a correlation between the chemical structure and biological activity of compounds - To characterize the bioinorganic compounds using the usual spectrometric methods - To understand how to rationalize and represent a mechanism for a chemical reaction - Describe inorganic compounds with medical applications
PREREQUISITES	Inorganic chemistry, coordination chemistry, organic chemistry, biochemistry
COURSE CONTENTS	1. Biocations. Bioligands 2. Ionic channels 3. Hydrolases: CPA, ACH, alkaline phosphatase, acid phosphatase 4. Metalloproteins: zinc fingers, Hb, Mb, transferin, ferritin, ceruloplasmin 5. Oxydoreductases: superoxide dismutases (Cu, Zn; Mn; Fe;Ni), catalase, peroxidase, tyrosinase 6. B12 coenzymes 7. Inorganic (coordination) compounds with medical applications: citostatic, antimicrobial, contrast agents

RECOMMENDED READING	1. M. N. Palamaru, Al. R. Iordan, Al. Cecal, *Chimie bioanorganică şi metalele vieţii*, Editura BIT, Iaşi, 1997. 2. M. N. Palamaru, Al. R. Iordan, Al. Cecal, *Chimie bioanorganică generală*, Editura Universităţii "Al. I. Cuza, Iaşi, 1998. 3. I. Grecu, I. Enescu, M. Neamţu, *Implicaţii biologice şi medicale ale chimiei anorganice*, Editura Ştiinţifică, Bucureşti, 1982. 4. R. M. Roat-Malone, *Bioinorganic Chemistry*, Acad. Press, London, 2004 5. A. Lehninger, *Biochimie*, vol. I, II, Editura Tehnică, Bucureşti, 1987, 1992. 6. E. Farkas, I. Sovago, Metal complexes of amino acids and peptides, *Amino acids, Peptides and proteins*, 2002, 33, 295 7. V. Aldea, V. Univaroşi, C. Ion, *Zincul, aspecte de chimie bioanorganică, farmacologie şi laborator clinic*, 1998. 8. Ruma Banerjee (Ed), *Chemistry and Biochemistry of B_{12}*, John Wiley, New York, 1999. 9. M. Gielen, E.R.T. Tienik (Ed), *Metallotherapeutic Drugs and Metal-Based Diagnostic Agents*, Wiley, 2005 10. G. Jaouen (editor), *Bioorganometallics*, Wiley-VCH, 2006
TEACHING METHODS	Presentation, cooperative learning, demonstration, discussions, discovery learning,

ASSESSMENT METHODS	Exam 50% Lab 25% Coursework 25%
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**STRUCTURAL , FUNCTIONAL AND GENETICS BIOCHEMISTRY**	CODE: CO3509

YEAR OF STUDY	III	SEMESTER	5	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. LECTURER GRADINARU VASILE ROBERT

OBJECTIVE OF THE COURSE	The objective of the lecture is to get to students the basic knowledges from protein structure, glycopreoteins and antibodies and their aplication in practice. Another aspect is to understand the mechanism for membranar proteins and their physiological role in biochimical proceses. The last part is dedicated in genetic methods. We are expecting a continuos interaction with the students and to introduce a broad range of methods for teaching.
PREREQUISITES	Organic chemistry General Biochemistry
COURSE CONTENTS	1. Aminoacids 2. Carbohydrates 3. Immunity. Antibodies 4. Lipids 5. Phosphorilation 6. Receptors 7. Xenobiotic metabolism 8. Nucleic acids 9. Protein expression 10. Chromosomes 11. Human genome project 12. Introduction in bioinformatics

RECOMMENDED READING	1. Fundamental of Biochemistry (2nd Edition)– Voet, D., Voet, J., Pratt, C. W. (2006). 2. Der Experimentator. *Proteinbiochemie/Proteomics* (5 Auflage)– Rehm, H. (2006). 3. Lehninger Principles of Biochemistry (2nd Edition)– Nelson, D. L., Cox, M. M. (2004). 4. Biochemistry (5nd Edition)– Berg, J.M., Tzmocyko, J.L., Stryer (2005). 5. Biochemie (Kompaktkurs), Universitatea Konstanz (Germania), Wendel, A. (2000). 6. Basiswissen Biochemie , (7 Auflage)–Loffler (2007). 7. Bioinformatics, A practical guide to the analzsis of genes and proteins-Ed. A. D. Baxevanis, B.F.F. Ouellette (2005)
TEACHING METHODS	Narration, demonstrated examples, knowledges synthesis, exposion, discovery learning, conversation, description of some case studies, modeling

ASSESSMENT METHODS	The final exam is the form of written test, which contains question from aminoacid, carbohydrates, lipids, histones structures, separation and investigation methods. The time for the test is two hours, the grade are 1 to 10.
LANGUAGE OF INSTRUCTION	romanian

COURSE TITLE	**NUCLEIC ACIDS AND PROTEINS**	CODE: CO3512

YEAR OF STUDY	III	SEMESTER	5	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR OF SCIENCE	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. PROFESSOR GABI DROCHIOIU

OBJECTIVE OF THE COURSE	This course aims at presenting the main ways and methods of investigation of nucleic acids and proteins. The students should use internet and recommended bibliography and the lab devices to isolate, purify and characterize the nucleic acids and proteins. They also must elaborate reviews and documentation files.
PREREQUISITES	Organic Chemistry, Biochemistry
COURSE CONTENTS	Structure, molecular weight, amino acid sequence of proteins. NMR and X ray analyses for determining the tridimensional structure. Edmann method for determining amino acid sequence. Immunological techniques of proteins. Solid phase synthesis (Merryfield) of peptides. Nucleic acids structure. Recombinant DNA Technology. Genetic manipulation. Clonning DNA. Modern methods used in fractioning and in investigating nucleic acids structure. New products of genetic biotechnologies. Lab works: Amino acid extraction from plant and animal tissues; Paper chromatography of amino acids; Paper protein electrophoresis; PAGE of proteins; Protein determination (Lowry, hydrylysis etc); Separation and partly purifying of corn zeins; Ovalbumin- Separation and partly purifying; Determination of nucleic acids; RNA determination with orcinol; DNA separation and purification by Marmur method.

RECOMMENDED READING	1. Lehninger, A. L. *Biochimie*, vol. I and II, Edit. Tehnică, Bucureşti, 1987, 1992. 2. Cojocaru, D. C., *Biochimia proteinelor şi acizilor nucleici*, Ed. Corson, Iaşi, 2003. 3. Nelson, D. L., Cox, M. M. *Lehninger Principles of Biochemistry*, Fourth Edition. W. H. Freeman & Comp., New York, 2004. 4. Berg, J. M., Tymoczko, J. L., Stryer, L. *Biochemistry*, 5 ed., W. H. Freeman and Co., New York, 2002. 5. Kellner, R., F., Lottspeich, Meyer, H. E. *Microcharacterization of proteins*. Wiley - VCH, Weinheim, New York, Toronto, etc. 1999. 6. N. Gheorghiţă, Iacobovici, A. Jerca, L. Popovici, I. *Biochimie medicală*. Univ. Med. Farm. Iaşi, 1996. 7. Zubay, G. *Biochemistry*, Addison-Wesley Publ. Comp., Massachusets, California, London, Amsterdam, Ontario, Sydney, 1983. 8. Artenie, V.G., Tănase Elvira, *Practicum de biochimie generală*, Ed. Univ. "Al. I. Cuza" Iaşi, 1981.
TEACHING METHODS	Lectures, seminars, lab works and demonstrations

ASSESSMENT METHODS	Lab works, reviews, documentation works; marks from 1 to 10 for each activity; 20 % for the review; 30 % lab works; 50 % written examination; Course attandance is essential.
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**MEMBRANE TRANSPORT AND BIOENERGETICS**	CODE: CF3514

YEAR OF STUDY	III	SEMESTER	5	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PH. D. ASSOCIATE PROFESSOR MIRCEA-ODIN APOSTU

OBJECTIVE OF THE COURSE	Presents the fundamentals notions used in the study of membrane transport and bioenergetics. Provide an understanding of the membrane transport mechanisms based on the fundamental concepts of chemistry, biochemistry and physics. The practical laboratory and seminars are focused on the study of transport through artificial and biological membranes.
PREREQUISITES	- Mathematics - Physics - Biochemistry - Chemical Thermodynamics - Chemical Kinetics - Organic Chemistry - Inorganic Chemistry
COURSE CONTENTS	1 Membranes classification. 2 Biological membranes – composition and structure. 3. Membranar processes. Selectivity, volumic flux. 4. Osmotic pressure. Donnan equilibrium. 5. Electrochemical potential. 6. Electrical potentials across membranes. 7. Diffusion potential. Henderson equation. 8. The electrical double layer. Helmholtz double layer. 9. Gouy-Chapman theory. 10. Electrocapillarity, electrophoresis and electroosmosis.

RECOMMENDED READING	1. M-O. Apostu, V. Melnig, *Bazele termodinamice ale transportului prin membrane*, Editura Universității "Al. I. Cuza", Iași, 2008; 2. M. E. Starzak, *The physical chemistry of membranes*, Academic Press, London, 1984; 3. M. Mulder, *Basic Principles of Membrane Technology*, Kluwer Academic Publishers, 1992; 4. M. Thellier, C. Ripoll, *Bases thermodynamiques de la biologie cellulaire*, MASSON, Paris, 1992; 5. O. Sten-Knudsen, *Biological membranes - Theory of transport, potentials and electric impulses*, Cambridge University Press, 2002; 6. R. E. Kesting, *Synthetic polymeric membranes – A structural perspective*, John Wiley & Sons, 1985; 7. P. W. Atkins C. A. Trapp, *Exerciții și probleme de chimie fizică*, Ed. Tehnică, București, 1997; 8. G. Bourceanu, A. Bîrzu, *Termodinamica evoluției și dinamică neliniară*, Ed. Matrix Rom, București, 2004; 9. A. L. Lehninger, *Biochimie*, Ed, Tehnică, București, (vol. 1)1987, (vol. 2)1992.
TEACHING METHODS	Presentation, Demonstration, Discussion

ASSESSMENT METHODS	Written examination from the content of the lectures and seminars which counts for 60% of the final grade. The activity during the laboratory is evaluated continuously and counts for the 40% of the final grade.
LANGUAGE OF INSTRUCTION	Romanian

TITLE OF THE COURSE	**BIOTECHNOLOGIES**	CODE: CF3511

YEAR OF STUDY	III	SEMESTER	5	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR OF SCIENCE	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PhD. LECTURER DOINA LUTIC

OBJECTIVE OF THE COURSE	Initiation of the students in the modern and economically important field of biotechnologies: their classification, general steps, peculiar requirements and cautions, additional preparation and separation steps, main applications widely applied at large and small scale (food and drug manufacturing, enviroment protection and remediation). Development students' capacity of synthesis in making connections between the knowledge acumulated up to date in the areas of chemistry, physics, biology, displaying posibilities of joining together the theoretical disciplins and the industrial practice. Introducing basic notions about the unit operations absolutely necessary for the progress of the biotechnological processes: examples how the theoretical anterior information can applied.
PREREQUISITES	Organic and Inorganic Chemistry, Physics, Thermodynamics, Kinetics, notions of Biology, Analytical Chemistry
COURSE CONTENTS	Part I. Generalities (Classification of biotechnologies, the main steps of the biologic/biotechnologic reactions, unit operations associated thereof, microorganisms involved in biotechnological processes) Part II. Background of biotechnologic processes: composition and sterilization of the culture mediums, types of bioreactors, parameters and kinetics of the fermentation, control and monitoring of the fermentation, post-synthesis processing of the growth medium) Part III. Main application fields of the biotechnological processes: milk products technologies, beer technology, wine technology, synthesis of drugs (beta-lactamic antibiotics, tetracyclines, vitamins), waste waters biotechnological treatment

RECOMMENDED READING	1. C. Oniscu, D. Caşcaval – Inginerie Biochimică şi Biotehnologie, volumul I, Ingineria proceselor biochimice, Editura Interglobal, Iaşi, 2002. 2. D. Caşcaval, C. Oniscu, Irina Galaction – Inginerie Biochimică şi Biotehnologie, volumul II, Bioreactoare, Editura Interglobal, Iaşi, 2004. 3. Gh. Mihăilă, N. Bîlbă – Tehnologie Chimică Generală, Editura Universităţii Al. I. Cuza Iaşi, 1995. 4. Ştefana Jurcoane - Biotehnologii. Fundamente. Bioreactoare. Enzime - Editura Tehnică, Bucureşti, 2000. 5. Ştefana Jurcoane (coordonator) - Tratat de biotehnologie, vol.I., II, Editura Tehnică, Bucuresti, 2004. 6. Evelini Popovici - Biotehnologii din industria alimentara, Editura Performantica, Iaşi, 2004. 7. C. Oniscu – Chimia şi T ehnologia Medicamentelor, Editura tehnică, Bucureşti, 1988. 8. R. Perrin, J.P. Scharff – Chimie industrielle, Editura Dunod, Paris, 1999. 9. **http://www.bookrags.com/research/biotechnology-wog/**
TEACHING METHODS	Use of video projection during course teaching, allowing things to be presented clearly by the use of tables, schemes, graphics Brief discutions in the beginning of the laborations in order to put a theoretical basis of the actual subject and connect previous informations from different disciplines

ASSESSMENT METHODS	Written examination followed by oral examination for those wanting a higher mark (80%) Colloqium in the last laboration from the part linked with the practical works (20%)
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**COORDINATIVE COMPOUNDS WITH BIOMIMETIC PROPERTIES**	CODE: CA3516

YEAR OF STUDY	III	SEMESTER	5	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. LECTURER CARMEN MITA

OBJECTIVE OF THE COURSE	To give the knowledge about the coordinative compounds, on the structure and reactivity of the active site of the metalloproteins, the computer modelling of the active site of the enzymes with metallic cofactor, other aspects related by the biomimetic coordinative compounds To improve the cognitive and practic abilities and dexterity necessary to the structural analysis, the determination f of the reactivity of the enzyme active site and the correct interpretation of the obtained results
PREREQUISITES	Nonmetal Chemistry, Metal Chemistry (I + II), Instrumental analysis
COURSE CONTENTS	1 Study of the capacities of the metal cations and ligands to form the biomimetic coordinative compounds. 2. Structure and symmetry of the coordinative compounds. 3.Teories of the chemical bonds from the coordinative compounds 4. Enzymes. Structural and functional modelling 5. Applications of the biomimetic coordinative compounds

RECOMMENDED READING	Grecu I., Enescu I., Neamtu M. - *Implicatii biologice si medicale ale chimiei anorganice*, Editura Junimea, Iasi, 1982. Lippard S.J., Berg J.M. - *Principles of Bioinorganic Chemistry*, University Science Books, Mill Valley, California, 1994. G. Neamtu - *Biochimie vegetala- Partea dinamica*, Editura Didactica si Pedagogica, Bucuresti, 1995 L. Stryer "Biochemistry", fourth edition, W. H. Freeman & co., New York, 1998 Palamaru, M. N., Iordan
TEACHING METHODS	Lecture, heuristic conversation, case study

ASSESSMENT METHODS	Form: Mixt (oral, written) Final grade formula: 50% (25% laboratory + 25% seminar) + 50% (final exam: 25% E1 exam week + 25% E2 exam week) Conditions: minimum grade for all forms of evaluation : 5.00
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**TOXICOLOGY**	CODE: CO3515

YEAR OF STUDY	III	SEMESTER	5	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR OF SCIENCE	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. PROFESSOR GABI DROCHIOIU

OBJECTIVE OF THE COURSE	This course aims at presenting the main ways and methods of investigation of nucleic acids and proteins. The students should use internet and recommended bibliography and the lab devices to isolate, purify and characterize the nucleic acids and proteins. They also must elaborate reviews and documentation files.
PREREQUISITES	Organic Chemistry, Inorganic Chemistry, Analytical Chemistry, Biochemistry
COURSE CONTENTS	Structure, molecular weight, amino acid sequence of proteins. NMR and X ray analyses for determining the tridimensional structure. Edmann method for determining amino acid sequence. Immunological techniques of proteins. Solid phase synthesis (Merryfield) of peptides. Nucleic acids structure. Recombinant DNA Technology. Genetic manipulation. Clonning DNA. Modern methods used in fractioning and in investigating nucleic acids structure. New products of genetic biotechnologies. Lab works: Amino acid extraction from plant and animal tissues; Paper chromatography of amino acids; Paper protein electrophoresis; PAGE of proteins; Protein determination (Lowry, hydrylysis etc); Separation and partly purifying of corn zeins; Ovalbumin- Separation and partly purifying; Determination of nucleic acids; RNA determination with orcinol; DNA separation and purification by Marmur method.

RECOMMENDED READING	1. T. J. Haley, W. O. Berndt, Handbook of toxicology, Harpen and Row, Cambridge, New York, Philadelphia, 1987. 2. C. A. Kimmel, J. Buelke-Sam, Developmental toxicology, Raven Press, 1981. 3. M. Cotrău, Implicații ale consumului de etanol în industria chimică. M.I.Ch., Iași, 1983. 4. M. Cotrău , Toxicologia substanțelor organice. Edit. M.I.Ch., Iași, 1985. 5. M. Cotrău , Toxicologie, Edit. did și ped., București, 1993. 6. G. Drochioiu, I. Druță, Toxicologie, Edit. Tao, Suceava, 1999. 7. G. Drochioiu, I. Mangalagiu, I. Druță, Elemente de teorie și practică toxicologică. Edit. Demiurg, Iași, 2001.
TEACHING METHODS	Lectures, seminars, lab works and demonstrations

ASSESSMENT METHODS	Lab works, reviews, documentation works; marks from 1 to 10 for each activity; 20 % for the review; 30 % lab works; 50 % written examination; Course attandance is essential.
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**STRUCTURAL ANALYSIS OF BIOORGANIC COMPOUNDS**	CODE: CO3611

YEAR OF STUDY	III	SEMESTER	6	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PH.D. LECTURER RAMONA ANTOANETA DANAC

OBJECTIVE OF THE COURSE	Understanding and utilization of mass spectrometry, NMR and IR spectroscopy as a tool for the solution of various structural problems of the organic compounds.
PREREQUISITES	Fundamentals of organic chemistry Chemistry of hydrocarbons and single functional group compounds Organic chemistry of multiple functional group compounds
COURSE CONTENTS	**Chemical methods**: Reactions for the identification, separation and dosing of the compounds with different functional groups. **Physical methods:** *Mass spectroscopy*: introduction and theory. Instrumentation. Predictions of bond fission. Types of ions. Interpretation of mass spectra of some chemical classes of organic compounds. ^{1}*H-NMR Spectroscopy*: Introduction and theory. Instrumentation. Chemical Shift. Spin-spin coupling. Application of NMR-spectroscopy in organic chemistry. *IR spectroscopy:* Applications of IR spectroscopy on some chemical classes of organic compounds.

RECOMMENDED READING	1. E. de Hoffmann, V. Stroobant, Mass Spectrometry. Principles and Applications (3rd edition), John Wiley & Sons, Ltd, 2007. 2. R. M. Silverstein, F. X. Webster, D. J. Kiemle, Spectrometric Identification of Organic Compounds (7th edition), John Wiley & Sons, Ltd, 2007. 4. H. Friebolin, Basic One- and Two-Dimensional NMR Spectroscopy (4th edition), Wiley VCH, 2005. 4. J.R. Hanson, Functional Group Chemistry, Wiley-Interscience, 2002. 5. Ioan Druta, Stabilirea structurii compusilor organici, 1987. 6. F. Albert, N. Barbulescu, C. Holszky, C. Greff, Analiza chimica organica. Editura tehnica, Bucuresti, 1970. 7. R. Danac, M. Roman, Probleme de analiza structurala organica, Ed Sedcomlibris, 2006, Iasi.
TEACHING METHODS	Lecture, conversation, demonstration

ASSESSMENT METHODS	Examination during semester, writing, oral at request
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**ANALYTICAL CONTROL OF BIOTECHNOLOGAL PROCESSES**	CODE: CA 3614

YEAR OF STUDY	III	SEMESTER	6	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	ASSOCIATED PROFESSOR PHD. OLARIU ROMEO-IULIAN

OBJECTIVE OF THE COURSE	The present course will provide detailed information with regard the evaluation of optimal biochemical processes through analytically rigorous and continuous main physic-chemical factors in all stages of biotechnological processes.
PREREQUISITES	Inorganic and Organic Chemistry, Chemical-Physics, Physics, .Analytical Chemistry, Biochemistry
COURSE CONTENTS	Biotechnologies - characteristics and significance. Analytical control and reliability of analytical methods used for characterization of biochemical processes. Monitoring and management of automatic bioreactors. Sampling techniques of bioreactor. Automatic control analyzers processes. Analysis by flow injection. Sterilization in the biochemical industry. Analysis of culture medium. Analytical methods for the determination of the sources of carbon, nitrogen, phosphorus. Controlling of chemical processes affect by pH, rH, content of CO_2 and O_2. Adjust automatic chemical parameters. Bio-separation and purification of products obtained by biosynthesis. Quality control of the biosynthesed products Applications. Analytical control in biosynthesis of antibiotics, vitamins, organic acids, proteins, enzymes, amino acids, food fermentation.

RECOMMENDED READING	1. C. Oniscu - Tehnologia produselor de biosinteză, Ed. Tehnica.,1978. 2. V. Magearu - Controlul analitic al proceselor biotehnologice, Ed. Tehnică,1988. 3. S. Jurcoane – Biotehnologii. Fundamente. Bioreactoare. Enzime, Ed. Tehnică, Bucureşti, 2000. 4. D. Cascaval, F. Ungureanu – Bioreactoare. Monitorizare, Ed. UMF, Iasi, 2000. 5. H. Dumitrescu, C. Milu – Controlul fizico-chimic al alimentelor, Ed. Medicala, Buc., 1997. 6. C. Oniscu, ş.a., Procese biotehnologice, Proteine şi enzime. Lucrări practice, Ed. UMF, Iaşi 2000. 7. I.G. David, G.L. Radu- Validarea metodelor (bio)analitice, Ed. Printech, Bucuresti, 2006.
TEACHING METHODS	Lecture, demonstration, solving exercises and problems.

ASSESSMENT METHODS	Discipline note	50% continue to laboratory and / or seminar 50% score course evaluation
	Course evaluation score	50% score evaluation in week 8^{th} 50% score evaluation in week 16^{th}
	Terms	Making full laboratory work and promote the final test given at the laboratory. Minimum score for each form of assessment is 5.
	Criteria	Achieving minimum performance standards related with discipline.
	Type	Written exam
LANGUAGE OF INSTRUCTION	Romanian	

COURSE TITLE	**QUANTUM BIOCHEMISTRY**	CODE: CF3612

YEAR OF STUDY	III	SEMESTER	6	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PH.D. PROESSOR MIRCEA CONSTANTINESCU PHD. ASSOC. PROFESSOR IONEL HUMELNICU

OBJECTIVE OF THE COURSE	Using theories of quantum chemistry and biochemistry to study the structure and reactivity of chemical and biochemical systems. Calculation of parameters needed to determine the chemical reactivity and biological activity of reaction centers. Computational modeling of structures of molecular systems that have a particular interest in biologically.
PREREQUISITES	Mathematical analysis (differential equations), Nonmetal chemistry, Fundamentals of organic chemistry, Chemical thermodynamics, Chemical kinetics, Quantum chemistry and structure, Structural, functional and genetical biochemistry, Nucleic acids and proteinsπ-electronic approximation
COURSE CONTENTS	Basic notions of quantum chemistry and biochemistry. π-electronic approximation. Electronic and energetic properties of. Semi-empirical methods for the calculation of structural and electronic properties of molecular systems. Qualitative theories of chemical reactivity. Quanto-chemical relative calculation of reaction capacity. Structure and reactivity for the principal classes of biological compounds. Proteins as electronic conjugated systems. Structure and reactivity of proteins. Amino acids structure. Structure and reactivity of enzymes, lipids, fat acids, nucleic acids and vitamins. Use computational technique for modeling and study amino acids, proteins and other biomolecular systems.

RECOMMENDED READING	1. I. Humelnicu, *Elemente de chimie teoretică*, Editura Tehnopress, Iaşi, 2003. 2. M.Constantinescu. Initiere în structura moleculară. Orbitale moleculare în chimie, Ed. Tehno Press 2003 3. B. Pullman, A. Pullman, *Quantum Biochemistry*, - Interscience Publication John Wiley & Sons Inc., New York, 1963. 4. A. L. Leningel, *Biochimie*, vol. I, II, Editura Tehnică, Bucureşti, 1987, 1992. 5. Z. Simon, *Biochimie cuantică*, Editura Ştiinţifică, Cluj, 1973. 6. Z. Simon, *Quantum Biochemistry and Specific Interactions*, Ed. Taylor & Francis; 1976 7. G.N. Szabo, A.W. Warshel, Computational Approaches to Biochemical Reactiviti, Kulver Academic Publishers, 2001 8. A. Chiriac, D. Ciubotariu and Z. Simon, *Relaţii calitative structură chimică-activitate biologică (QSAR). Metoda MTD*, Editura Mirton, Timişoara, 1996. 9. I. Simiti, I. Schwartz, *Structură chimică. Activitate biologică*, Ed. Dacia, Cluj, 1974. 10. A. Rappe, C. Casewit, *Molecular Mechanics across Chemistry*, University Science Books, Sausalito, California, 1997.
TEACHING METHODS	PRESENTATION

ASSESSMENT METHODS	1. From the content of the lecture, there are two partial exams, in eighth and sixteen week of the semester, with 50% contribution of the final grade. 2. For the practical laboratory, there is an exam during the semester, counting for 50% of the final evaluation.
LANGUAGE OF INSTRUCTION	ROMANIAN

COURSE TITLE	**CLINICAL ANALYSIS**	CODE: CA3615

YEAR OF STUDY	III	SEMESTER	6	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	**CC**

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. LECTURER BÂRSĂNESCU ADRIANA

OBJECTIVE OF THE COURSE	- to elucidate the theoretical and practice principles of analytical methods and techniques, that may help the students in the practice of Clinical Laboratory, to show them how to utilize these information's; - to clarify the newer knowledge of the interrelations between analytical signal and blood, urine, LCR components levels. -to understand the clinical application of bioanalytical chemistry**.**
PREREQUISITES	The fundamentals of analytical, inorganic and organic chemistry; Instrumentals Analysis.
COURSE CONTENTS	**Part I** - Analytical Techniques and Instrumentations for clinical determinations. **Part II** - Applications on biological samples (blood, serum and other body fluids) - analytical procedures and clinical correlations: - Blood gases, pH and Buffer Systems; - Electrolytes; - Carbohydrates; methods of glucose determinations; - Lipids and lipoproteins; methods of measurements; - Nonprotein Nitrogen; methods of measurements of urea, creatinine / creatine; uric acid; ammonia; - Proteins; methods of determinations in blood, serum and other body fluids;

RECOMMENDED READING	l. Duca Al., Luca C., Crișan I., *Chimie analitică şi analiză instrumentală*, EDP, Buc., 1983; 2. Magearu V., *Controlul analitic al proceselor biotehnologice*, ET., Buc., 1988; 3. Dinu V., Truția E., Popescu A., Popa E., Cristea C., *Biochimie medicală*, Ed.Med., Buc., 1996; 4. Kekedy L., *Senzori electrochimici metalici şi ion selectivi*, EA., Buc., 1987; 5. Dăneț A.F., *Metode instrumentale de analiză chimică*, Ed.Ştiintifica., Buc., 1995; 6. Dăneț A.F., *Metode electrochimice de analiză*, Ed.Științifică, Buc., 1996; 7. Mihele D., *Biochimie clinica*, Ed.Med., Buc., 1997. 8. Manole Gh., Galetescu E.M., Mateescu M., *Analize de laborator. Ghid privind principiile, metodele de determinare si interpretare a rezultatelor*, Ed.CNI Coresi, Buc., 2005; 9. *Mihele D., Pavlovici M., Biochimie clinică. Metode de laborator*, Ed.Med., Buc., 1996.
TEACHING METHODS	Lecture, laboratory, consultations.

ASSESSMENT METHODS	Writing examination
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**ENZYMOLOGY**	CODE: CO3614

YEAR OF STUDY	III	SEMESTER	6	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. LECTURER GRADINARU VASILE ROBERT

OBJECTIVE OF THE COURSE	The objective of the lecture is to get to students the basic knowledges for enzyme nomenclature, enzymatic reaction, and their clinical aplication. Another aspect is to understand the mechanism involved enzymes and their physiological role in biochimical proceses. The last part is dedicated in clinical methods for diagnostic purposes. We are expecting a continuos interaction with the students and to introduce a broad range of methods for teaching
PREREQUISITES	Organic chemistry General Biochemistry, Molecular biology and Genetic Biochemitry and genetics
COURSE CONTENTS	1. Nomenclature 2. Enzyme isolation and characterization 3. Enzyme activity. Specific activity 4. Techniques for estimation of enzymatic processes 5. Mechanistic aspects for enzyme catalysis 6. Technological and clinical aspects of enzymology.

RECOMMENDED READING	1. Practical enzymology – H. Bisswanger (1st reprint Wiley-VCH)-2007 2. Enzyme assays, High-throughput Screening, Genetic Selection and Fingerprinting – Reymond, J.-L. (Wiley-VCH)-2006 3. Enzymes: A Practical Introduction to Structure, Mechanism, and Data Analysis (second edition), R. A. Copeland (2000). 4. Fundamental of Enzymology (second edition) – N. C. Price, L. Stevens (Oxford)-1989. 5. Enzyme. Structure and Mechanism (second edition), A. Fersht (1984). 6. Enzyme Kinetics. The Steady-state Approach, Engel, P. C. (1977). 7. The enzymes (third edition), P. D. Boyer (1976).
TEACHING METHODS	Narration, demonstrated examples, knowledges synthesis, exposion, discovery learning, conversation, description of some case studies, modeling

ASSESSMENT METHODS	The final exam is the form of written test, which contains question from enzyme history, enzyme nomenclature, mechanisms of action, investigation methods and their clinical significance. The time for the test is two hours, the grade are 1 to 10.
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**BIOMATERIALS**	CODE: CF3615

YEAR OF STUDY	III	SEMESTER	6	TYPE OF COURSE (CC-compulsory / OC - optional/EC-elective)	**CC**

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	**5**

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. ASSOCIATE PROFESSOR ALEXANDROAEI MARIA

OBJECTIVE OF THE COURSE	The aim of the course is to offer the general properties of metallic, ceramic and polymeric materials employed as biomedical applications in the human body. Also are included the mechanical, electrochemical, immunological, and toxicological aspects of compatibility between biomaterials and the body environment.
PREREQUISITES	STRUCTURAL, FUNCTIONAL AND GENETIC BIOCHEMISTRY ; BIOTECHNOLOGIES
COURSE CONTENTS	Biomaterials – Definition, Characterization. Metallic materials used for implants: stainless steel; Co-Cr alloys; Ti-alloys; dental metals. Electrochemical aspects; Rate of corrosion and polarization curves. Ceramic biomaterials used for implants: bioinert, resorbable, bioactive and biodegradable ceramics. Polymeric biomaterials used for implants: definitions, some polymers used as biomaterials: polyethylene; ethylene–vinyl acetate copolymer; lactide–glycolide copolymer; vinyl methyl ether–maleic acid copolymer; development of antimicrobial polymeric formulations. Composite biomaterials used for implants: bounds, anisotropy of composites; porous materials. composites with metallic, ceramic and polymeric matrix. Perspectives in the biomaterials science.

RECOMMENDED READING	1. Gorduza L., *Biomateriale, biotehnologii, biocontrol*, Ed. CERMI, Iaşi, 2002. 2. Pop Gh., *Biomateriale şi compon. protetice metalice*, Ed.TEHNOPRESS, Iaşi, 2004. 3. Simon V., *Fizica biomaterialelor*, Ed. Presa Universitară Clujeană, 2002. 4. Rândaşu I., *Biomateriale stomatologice*, Ed Medicală, Bucureşti, 1996. 5. Bunea,D., Nocivin,A., *Materiale biocompatibile*, Ed.BREN Bucuresti, 1998. 6. Alexandroaei, M., *Biotehnologii în industria farmaceutică: lucrări practice şi probleme,* Ed. Performantica Iaşi, 2007.
TEACHING METHODS	Theoretical lectures and experimental methods used in the biomaterials characterization: The utilization of simple mathematical procedures to processing the obtained experimental results.

ASSESSMENT METHODS	Written and oral tests. Final grade calculation: 50% activity to laboratory; 50% final written examination
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**ADVANCED ORGANIC CHEMISTRY**	CODE: CO4142

YEAR OF STUDY	I	SEMESTER	1	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER OF SCIENCE	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. ASSOCIATE PROFESSOR MIHAIL- LUCIAN BÎRSĂ

OBJECTIVE OF THE COURSE	This course is intended for students who have already had substantial exposure to organic chemistry. Its purpose is to familiarize the student with advanced aspects of organic reactions and especially with reaction mechanisms.
PREREQUISITES	B. Sc. degree
COURSE CONTENTS	- Radical Substitution Reactions at the Saturated C Atom - Nucleophilic Substitution Reactions at the Saturated C Atom - Elimination reactions - Substitution Reactions on Aromatic Compounds - Addition reactions - Oxidations and Reductions

RECOMMENDED READING	1. C.D. Nenițescu, *Chimie Organică*, ed. a VIII-a, vol I şi II, Ed. Didactică şi Pedagogică, Bucureşti, 1980. 2. F. Badea, *Mecanisme de Reacție in Chimia Organică*, ed. a II-a, Ed. Ştiințifică, Bucureşti, 1971. 3. F. Badea, F. Kerek, *Stereochimie*, Ed. Ştiințifică, Bucureşti, 1974. 4. H. Becker s.a., *Organicum*, Ed. Ştiințifică şi Enciclopedică, Bucureşti, 1982. 5. B.K. Carpenter, *Determination of Organic Reaction Mechanisms*, John Wiley&Sons, New York, 1984. 6. R. Bruckner, *Advanced Organic Chemistry. Reaction Mechanism*, Harcourt/Academic Press, San Diego, 2002.
TEACHING METHODS	Presentation

ASSESSMENT METHODS	Written
LANGUAGE OF INSTRUCTION	Romanian or english, on demand

COURSE TITLE	**INORGANIC MEDICINAL CHEMISTRY**	CODE: CN4144

YEAR OF STUDY	I	SEMESTER	1	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	LECTURER PH.D. MONICA TOMA

OBJECTIVE OF THE COURSE	To understand elementary concepts of medicinal chemistry, to establish the correlation between chemical structure and biological activity (SAR and QSAR), characterization of coordiantion compounds with therapeutic potential using specific spectroscopic methods, to understand and propose mechanism for the biological activity of inorganic compounds, evaluation of the biological activity of a new coordination compound.
PREREQUISITES	Coordination chemistry, bioinorganic chemistry, biochemitry
COURSE CONTENTS	1. Inorganic compounds with antimicrobian activity 2. Coordination compounds with antitumoral (citostatic) activity 3. Inorganic compounds used as contrast agents in MRI 4. Insulin-like activity of some inorganic (coordination) compounds 5. Inorganic compounds used as antiacids

RECOMMENDED READING	1. J. L. Sessler (Ed.), *Medicinal Inorganic Chemistry*, Oxford Universitz Press, 2005 2. R. M. Roat-Malone, *Bioinorganic Chemistry*, Acad. Press, London, 2004 3. M. Gielen, E.R.T. Tienik (Ed), *Metallotherapeutic Drugs and Metal-Based Diagnostic Agents*, Wiley, 2005 4. N. Farrell, Metal Complexes as Drugs and Chemotherapeutic agents, în *Comprehensive Coordination Chemistry*, II (9), cap. 9.18., pag. 809 5. A. Lehninger, *Biochimie*, vol. I, II, Editura Tehnică, Bucureşti, 1992 6. G. Jaouen (editor), *Bioorganometallics*, Wiley-VCH, 2006 7. I. Kostova, *Recent Pattents on Anti-Cancer Drug Discovery*, 2006, 1, 1. 8. D. W. Kufe, R. E. Pollock et. al, Cisplatin în, *Cancer Medicine*, 6th Ed. Decker Inc, 2003. 9. I. Kostova, Anti-Cancer Agents Med.-Chem., 2007, 1
TEACHING METHODS	Presentation, cooperative learning, demonstration, discussions, discovery learning

ASSESSMENT METHODS	Exam 50% Coursework 50%
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**BIO- AND SEMISYNTHESIS MEDICAMENTS**	CODE: CS4102

YEAR OF STUDY	I	SEMESTER	1	TYPE OF COURSE (CC-compulsory/OC-optional/EC-elective)	CC

LEVEL OF COURSE	NUMBER OF ECTS CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD ASSOC. PROFESSOR NECULAI – CĂTĂLIN LUNGU

OBJECTIVE OF THE COURSE	To transmit the main knowledge about biosynthesis medicaments with and whithout heterocyclic skeleton. Description of the fundamentals of the bio(semi)synthesis and action mechanism of this medicaments, using the results of organically chemistry, biochemistry, industrial microbiology and bioengineering. To create the students ability to understand the obtaining processes of these medicaments. At the end of this course the students should be able to apply this knowledge in the practical sphere and even research domains.
PREREQUISITES	Organically Chemistry, Biochemistry, Synthesis of Organically Compounds, Biotechnology
COURSE CONTENTS	- Aspects of biosyntheses technologies of medicaments. - Antibiotics: Generally characterisation. β-lactamic antibiotics: penicillins, cephalosporins, carbopenems, penems, monobactams, β-lactamases inhibitors. Griseofulvin. Aminoglucosidics antibiotics. Macrolids and cetolids antibiotics. Others classes of antibiotics. - Others classes of medicaments as secondary metabolites of micro organisms. - Vitamins and hormones.

RECOMMENDED READING	1. A. H. Scragg (editor) - Biotechnology For Engineers - Biological Systems in Technological Processes, John Wiley & Sons - Sheffield, England, l988. 2. C. Oniscu - Chimia şi tehnologia medicamentelor, Editura Tehnică, Bucureşti, l988. 3. M. Larpent-Gourgand şi J. J. Sanglier - Biotechnologies - Principes et méthodes, Doin Editeurs - Paris, France, l992 4. Ş. Jurcoane (coordonator) – Tratat de Biotehnologie, vol. I, Editura Tehnică, Bucureşti, 2004. 5. A.-I. Galaction şi D. Caşcaval – Metaboliți secundari cu aplicații farmaceutice, cosmetice şi alimentare, Casa de editură Venus, Iaşi 2006. 6. N.-C. Lungu – Fundamente ale bioindustriei – Bioprocesele la scară mare, Editura Performantica, Iaşi 2008.
TEACHING METHODS	Oral and writing presentation and seminarisation. Working in laboratory of medicaments chemistry and biochemistry.

ASSESSMENT METHODS	Conditions: - a full activity in laboratory and cours, - minim 5 for laboratory activity. Criteria: - the results obtained in respective semester. Forms: - writing and /or oral presentation. Final grade calculation: 40 % semestrial seminar and laboratory activity, plus 60 % examen note (30 % first sesion, plus 30 % second sesion).
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**PHYSICAL CHEMISTRY OF BIOCOMPATIBLE POLYMERS**	CODE:

YEAR OF STUDY	I	SEMESTER	1	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	OC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PH. D. ASSOCIATED PROFESSOR MIRCEA-ODIN APOSTU

OBJECTIVE OF THE COURSE	The polymeric materials play a very important role in the modern society. Natural and synthetic polymers are used in almost all fields of activity. The course aims to introduce the fundamentals notions and experimental methods which are necessary for the study of the natural, synthetic and biocompatible polymers. Another important scope is to emphasis the connections between the chemical nature, properties and utilization fields of polymers. Taking into account the technological progress achieved and the diversity of applications of polymers is necessary to explain correctly, starting from clear notions, the experimental results in order to establish correlations between the structure and the properties of polymers.
PREREQUISITES	- MATHEMATICS, PHYSICS - CHEMICAL THERMODYNAMICS, CHEMICAL KINETICS, COLLOIDAL CHEMISTRY - ORGANIC CHEMISTRY
COURSE CONTENTS	1. Macromolecular state: definitions, structural characteristics. 2. Types of average molecular masses of polymers. Polydispersity of macromolecular substances. Methods for polymer fractionation. Molecular mass distribution curves. 3. Thermodynamics of polymer solutions. Dissolution heat. Dissolution entropy. Polymer-solvent mixing Gibbs energy. Flory-Huggins theory of macromolecular solutions. 4. Coligative properties of polymer solutions. Molecular mass determination by tonometry, cryoscopy, ebullioscopy and final group titration. 5. Osmotic pressure of polymer solutions. Determination of numeric average molecular mass and of the second virial coefficient, A2. The relation between A2 and the Flory-Huggins interaction coefficient. Theta conditions for polymer solutions. 6. Structural-thermodynamic parameters specific to polymers. Definitions and methods for determination. Average dimensions. Gyration radius. Volume effects. Flexibility of macromolecular chains. 7. Polymer solutions viscosity. Viscosity dependence on concentration. Structural-thermodynamic information obtained from viscosity measurements. The relation between intrinsic viscosity and the molecular mass. 8. Light scattering from polymer solutions. Determination of gravimetric average molecular weight, of the second virial coefficient and of the gyration radius. 9. Aggregation states and phase states of polymers. Glass transition in polymers. Definitions and experimental methods. Practical importance. 10. Polymers degradation. Environmental impact.

RECOMMENDED READING	1. Ana Onu, *Chimia fizica a starii macromoleculare*, Ed.Tehnopress, Iasi, 2002. 2. M. Leca, *Chimia fizica a macromoleculelor*, Ed.Univ.Bucuresti,1998. 3. D.J. Sandman, *Crystallographically ordered polymers*, American Chemical Society, Washington, 1987. 4. P. W. Atkins, C. A. Trapp, *Exerciţii şi probleme de chimie fizică*, Ed. Tehnică, Bucureşti, 1997. 5. M. Daranga, C. Mihailescu, M. Popa, M. Nicu, N. Bejan, *Fizica polimerilor*, Ed. Ex Libris, Braila, 2000. 6. V. Isac, Ana Onu, C. Tudoreanu, Gh. Nemtoi, *Chimia fizica. Lucrari practice*, Ed. STIINTA, Chisinau, 1995 7. H. Fujita, *Polymer Solutions*, Elsevier, 1997.
TEACHING METHODS	PRESENTATION, DEMONSTRATION, DISCUSSION

ASSESSMENT METHODS	WRITTEN EXAMINATION FROM THE CONTENT OF THE LECTURES AND SEMINARS WHICH COUNTS FOR 50% OF THE FINAL GRADE. THE ACTIVITY DURING THE LABORATORY IS EVALUATED CONTINUOUSLY AND COUNTS FOR THE 50% OF THE FINAL GRADE.
LANGUAGE OF INSTRUCTION	ROMANIAN

COURSE TITLE	**ELECTROCHEMICAL PROCESSES INVOLVED ON DRUG ACTIVITY**	CODE: CF4229

YEAR OF STUDY	I	SEMESTER	2	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. PROFESSOR GHEORGHE NEMȚOI

OBJECTIVE OF THE COURSE	This course has a well-defined role in the training of future specialists preparing the Master Degree, being a part of the achievement of their multidisciplinary instruction. The course is focused on the unitary ordering and presentation of the notions concerning a series of electrochemical processes occurring in the human body, in connection with the action mode of the medicines used in some diseases curing.
PREREQUISITES	Physics - Electricity, Analytical Chemistry, Physical Chemistry, Bioelectrochemistry
COURSE CONTENTS	The electron transport in the oxidative-reductive enzymes, oxidative phosphorilation, the respiratory methabolism partition, methods for the study of the redox processes, double electrochemical layer, studies of linear and cyclic voltammetry involved in the characterization of medicine behavior.

RECOMMENDED READING	1. A.L.Lehninger, Biochimie, vol.1, Editura Tehnică, Bucureşti, 1987. 2. Gh. Nemțoi, V. Isac, Chimie fizică-Electrochimie, Editura Ştiința, Chişinău, 1997; . A.J.Bard and L.Faukner, Electrochimie, Principes,methodes et applications, Masson, 1983; . C.M.A.Brett and A.M.O.Brett, Electrochemistry: Principles, Methods and Application, Oxford University Press, 1993; . D.T.Sawyer, A.Sobkowiak and J.L.Roberts, Electrochemistry for Chemists, 2nd Ed.J.Wiley & Sons, New York, 1995 6. C.Beldie, Gh.Nemțoi, Soluții de polielectroliți, Editura Timpul, Iaşi, 2000;
TEACHING METHODS	Heuristic method as teaching method for explanation; training of the students to assimilate the new knowledge and algorithmic method for its application in practice

EVALUATION METHODS	Average mark: 50% (40-60%) Continuous evaluation at laborations 50% (60-40%) Final evaluation of the knowledge from course notions Final course average mark: 50% Evaluation in the 8th week 50% Evaluation in the 16th week Admission conditions: Minimal average mark for each evaluation form is 5 Criteria: Achievement of the minimal performance standards corresponding to the discipline Examination forms: written work evaluation based on the course information
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**ADVANCED BIOINORGANIC CHEMISTRY**	CODE: CN4245

YEAR OF STUDY	I	SEMESTER	2	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. PROFESSOR ALEXANDRA RALUCA IORDAN

OBJECTIVE OF THE COURSE	This course has the purpose to provide the students with those knowledges that will allow them to read critically papers concerning bioinorganic issues and to join with little difficulties research groups dealing with bioinorganic chemistry.
PREREQUISITES	Students must possess a basic knowledge of biochemistry and of coordination chemistry
COURSE CONTENTS	The frontiers of bioinorganic chemistry. Roles of metalloproteins in cells: choice, uptake and assembly of metal containing units in biology. Tuning of metal properties by proteins to obtain specific functions Metal protein analysis according to the metal: Iron, Copper, Molybdenum, Cobalt, Zinc and other metals. Elements of design, synthesis and study of syntetic metalloreceptors or the selective recognition of biological substrates.

RECOMMENDED READING	1) Bertini I., Gary H. B., Stiefel E. I., Valentine J. S., Biological Inorganic Chemistry, University Science Books, 2006 2) Palamaru M. N., Iordan Al. R., Popa K., BazeleChimie bioanorganice. Lucrări practice si aplicații, Editura Tehnopress, Iaşi, 2004. 3) Palamaru M. N., Iordan Al. R., Cecal Al., Chimie bioanorganică generală, Editura Universității "Al. I. Cuza, Iaşi, 1998. 4) Palamaru, M.N., Iordan, Al.R., Cecal, Al., Chimie bioanorganică şi metalele vieții, Editura BIT, Iaşi, 1997. 5) Lippard S.J., Berg J.M. - Principes de biochimie minérale, De Boeck Université, 1997 6) Blondin G., Girerd J.J., Meunier B. - Chimie bioinorganique, Ecole Polytechnique Palaiseau, France, 1996.
TEACHING METHODS	Lectures, Collective problem solving

ASSESSMENT METHODS	Written examination (50%) and quizzes to assess practical skills (50%)
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**CHROMATOGRAPHIC TECHNIQUES IN ANALYSIS OF MEDICINAL AND COSMETIC PRODUCTS**	CODE: CA4217

YEAR OF STUDY	I M	SEMESTER	2	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	LECTURER PHD. CECILIA ARSENE

OBJECTIVE OF THE COURSE	**Cognitive** Developing of an overall idea on the most powerful chromatographic techniques applicable in laboratories for chemical analysis. Obtaining of a good theoretical background on the specific characteristics of gas and liquid chromatography techniques. Competences for an appropriate identification of the most suitable chromatographic techniques for analysis of complex matrices. **Skills** Practical skills in the operation of chromatographic techniques. Skills required for experienced analysts in chemical laboratory investigations.
PREREQUISITES	Instrumental analyses.
COURSE CONTENTS	Techniques and methods of separation. Major classes of chromatographic techniques. Liquid chromatography (HPLC and IC). Ion pair chromatography. Gas chromatography (GC). Hyphenated chromatographic methods (GC-GC, HPLC-MS) in the analysis of chemical systems. Preparative aspects to investigate chemical systems by chromatographic techniques. Application of chromatographic techniques in the analysis of complex matrices.

RECOMMENDED READING	9. Comprehensive analytical chemistry, ed., Barcelo, D., Modern instrumental analysis (vol. 47), Ahuja, S., Jespersen, N., eds., Elsevier, 2006. 10. Chimie analitica şi instrumentala, Nascu, H.I. and Jantschi, L., Academic Pres&Academic Direct, Cluj Napoca, Romania, 2006. 11. Standard methods for the examination of water and wastewater 20th Edition, 2005. 12. Chromatography, 6th edition, Fundamentals and applications of chromatography and related differential migration methods, Heftmann, E., ed., Elsevier, 2004. 13. Encyclopaedia of analytical chemistry, ed. R.A. Meyers, John Wiley – Sons, Chicester, 2000. 14. Analytical chemistry, Kellner, R., Mermet, J.M., Otto, M. and Widmer, H.M., eds., Wiley-VCH, Verlag, Germany1998. 15. Ion chromatography, Small, H., Plenum Press, New York, 1989.
TEACHING METHODS	Lecture, interactive discussion, demonstration, direct practical applications.

ASSESSMENT METHODS	Discipline note	50% continue to laboratory and / or seminar 50% score course evaluation
	Course evaluation score	50% score evaluation in week 8^{th} 50% score evaluation in week 16^{th}
	Terms	Making full laboratory work and promote the final test given at the laboratory. Minimum score for each form of assessment is 5.
	Criteria	Achieving minimum performance standards related with discipline.
	Type	Written exam.
LANGUAGE OF INSTRUCTION	Romanian	

COURSE TITLE	**BIOCOMPATIBLE NANOMATERIALS**	CODE: CM4208

YEAR OF STUDY	I	SEMESTER	2	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	OC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER STUDIES	**6**

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. PROFESSOR EVELINI POPOVICI

OBJECTIVE OF THE COURSE	The main objectiv of this course is to introduce the PhD students in world of biocompatible materials in nanometer scales and to summarize the essential aspects of nanomedicine, of synthesis and processing of nanobiomaterials. Also, the course is devoted to fundamental understanding of the relationships between physico-chemical properties of nanomaterials and biocompatibility.
PREREQUISITES	Coordinative Chemistry, Colloidal Chemistry, Nano-Physics, Technology and Biotechnology
COURSE CONTENTS	The course content comprises the fundamental understanding of the relationships between physico-chemical properties of nanomaterials and biocompatibility. The development of supramolecular chemistry and the application of organic-inorganic hybrid materials in the biomedical field have resulted in a new generation of advanced materials, which exhibit fascinating properties for regenerative purposes together with the possibility of being used as carriers of biologically active molecules. The newest hybrid bioactive materials and templated mesoporous bioactive systems are discussed from the point of view of their potential applications as replacement materials in bone repair and regeneration. Obtainment, classification and properties of drug delivery systems.
SEMINARS CONTENTS	Creativity concept. Demonstrative and illustrative presentations learning by applying well established algorithms. Interactive methods.

RECOMMENDED READING	- Gorduza L., *Biomateriale, biotehnologii, biocontrol*, Ed. CERMI, Iaşi, 2002. - Bunea D., *Materiale biocompatibile,* Ed. BREN Bucureşti, 1998. - Pop Gh., *Biomateriale şi componente protetice metalice*, Ed.TEHNOPRESS, Iaşi, 2004. - Simon V., *Fizica biomaterialelor*, Ed. Presa Universitară Clujeană, 2002. - Bunea,D., Nocivin,A., *Materiale biocompatibile*, Ed.BREN Bucuresti, 1998. - Eveline Popovici, Emiliana Dvininov, Materiale nanostructurate:Prezent si Viitor, Vol.I. Nanoparticule, 2007, Casa Editoriala Demiurg, , ISBN 978-973-152-002-5. - Eveline Popovici, Elena Seftel, Materiale nanostructurate:Prezent si Viitor, Vol.II. Argile anionice, 2007, Casa Editoriala Demiurg, ISBN 978-973-152-002-5.
TEACHING METHODS	Teaching methods: attractive exposure, heuristic conversation, demonstrative and illustrative presentations learning by applying well established algorythms, interactive methods.

ASSESSMENT METHODS	50% Continuos evaluation seminars 50% Final evaluation course 50% Evaluation in the 8-th week 50% Evaluation in the 16-th week Minimum mark of 5 at each evaluation form Fulfilment of minimum standards of performance in management Area. Writing examination
LANGUAGE	Romanian

COURSE TITLE	**COORDINATION COMPOUNDS IN NATURAL SYSTEMS AND ENVIRONMENTAL PROTECTION**	CODE: CN4149

YEAR OF STUDY	I	SEMESTER	1	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. PROFESSOR MIRCEA-NICOLAE PALAMARU

OBJECTIVE OF THE COURSE	To provide students an overview of the existence and role of coordination compounds in natural systems and their use in environmental protection
PREREQUISITES	
COURSE CONTENTS	Stocarea, transportul si biomineralizarea metalelor – generalități:- biodisponibilitatea ionilor metalici;- funcții biologice ale ionilor metalici ;- Zn, Cu, Mo, Cr, V, Ni – transport și stocare. Rolul structural al ionilor metalici: domeniul de legare a Zn în proteinele de legatură ale acizilor nucleici. Rolul compușilor coordinativi ai vanadiului în stimularea reacțiilor catalizate enzimatic. Compusi coordinativi metalici, inhibitori enzimatici. Biorecuperarea metalelor din soluri prin folosirea de liganzi fitochelatici. Use of coordination compounds in decontamination effluent containing radioelements. Utilizarea compușilor coordinativi pentru eliminarea metalelor grele din apele uzate Storage, transport and metal biomineralisation - General: - bioavailability of metal ions - the biological functions of metal ions - Zn, Cu, Mo, Cr, V, Ni - transport and storage. The role of vanadium coordination compounds in stimulating the enzyme catalyzed reactions. Metal coordination compounds, enzyme inhibitors. Biorecuperation of soils Contaminated with heavy metals. Use of coordination compounds in decontamination effluent containing radioelements Use of coordination compounds to remove heavy metals from wastewater

RECOMMENDED READING	1. Eichhorn G.L. - Inorganic Biochemistry, Elsevier Scientific Publishing Company, New York, 1975. 2. Lippard S.J. - Progress in Inorganic Chemistry: Bioinorganic chemistry, vol.38, John- Wiley & Sons, Inc., New York,1990. 3. Lippard S.J., Berg J.M. - Principles of Bioinorganic Chemistry, University Science Books, Mill Valley, California, 1994. 4. Blondin G., Girerd J.J., Meunier B. - Chimie bioinorganique, Ecole Polytechnique Palaiseau, France, 1996. 5. Palamaru, M.N., Iordan, Al.R., Cecal, Al., Chimie bioanorganică și metalele vieții, Editura BIT, Iași, 1997. 6. M. N. Palamaru, Al. R. Iordan, Al. Cecal, Chimie bioanorganică generală, Editura Universității "Al. I. Cuza, Iași, 1998. 7. Ghizdavu, L., Chimie bioanorganică, Poliam cluj Napoca, 2000. 8. M. N. Palamaru, Al. R. Iordan, K. Popa, BazeleChimie bioanorganice. Lucrări practice si aplicații, Editura Tehnopress, Iași, 2004.
TEACHING METHODS	Lecture, interactiv methods, case study

ASSESSMENT METHODS	Conditions: 100% attendance for seminars Forms: examination durind the semester and final written examination Final grade calculation: 50% examen and 50% seminars
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**ENZYME KINETICS**	CODE: CF4134

YEAR OF STUDY	I	SEMESTER	1	TYPE OF COURSE (CC-compulsory/OC-optional/EC-elective)	CC

LEVEL OF COURSE	NUMBER OF ECTS CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PH. D. ASSOCIATE PROFESSOR ADRIAN BÎRZU

OBJECTIVE OF THE COURSE	The course aims to present the main aspects of enzyme kinetics. The practical activities and seminars familiarize the students with the main methods used in kinetic studies of enzyme catalysed reactions.
PREREQUISITES	Chemical kinetics; Mathematics.
COURSE CONTENTS	1. The way of enzymatic action in biological catalysis. 2. Characterization of enzymatic activity. 3. Reversible enzymatic inhibition. 4. Irreversible enzymatic inhibition. 5. PH dependence of enzyme reaction. 6. Enzymatic reactions with two substrates. 7. Multi-site and cooperative enzymes. 8. Imobilized enzymes. 9. Interfacial enzymes. 10. Characterization of enzymatic stability.

RECOMMENDED READING	1. A. Bîrzu, M. Dumitraş, *Cinetică chimică. Aspecte fundamentale*, MatrixROM, Bucureşti, 2008. 2. R. I. Masel, *Chemical Kinetics and Catalysis*, Wiley, 2001. 3. J. Steinfeld, J. Francisco, W. Hase, *Chemical Kinetics and Dynamics*, Prentice Hall, 1989. 4. K. J. Laidler, *Chemical Kinetics*, Harper&Row, 1987. 5. D. V. Roberts, *Enzyme kinetics*, Cambridge University Press 1977. 6. R. Copeland, *Enzymes*, Wiley, 2000. 7. V. Isac, N. Hurduc, *„Chimie fizică. Cinetică chimică şi cataliză”*, Ed. Ştiinţa, Chişinău 8. V. Isac, A. Onu, C. Tudoreanu, Gh. Nemţoi, *„Chimie fizică. Lucrări practice”*, Editura Ştiinţa, Chişinău, 1995 9. A. G. Marangoni, *"Enzyme kinetics. A modern approach"*, Wiley, 2003.
TEACHING METHODS	Lecture

ASSESSMENT METHODS	2x25% of the final grade for two written tests from the seminar applications (weeks 7 and 15 of the semester), and 2x25% for two written exams from the content of the lectures (weeks 8 and 16).
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**ADVANCED ORGANIC CHEMISTRY**	CODE: CO4147

YEAR OF STUDY	I	SEMESTER	1	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER OF SCIENCE	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. ASSOCIATE PROFESSOR MIHAIL- LUCIAN BÎRSĂ

OBJECTIVE OF THE COURSE	This course is intended for students who have already had substantial exposure to organic chemistry. Its purpose is to familiarize the student with advanced aspects of organic reactions and especially with reaction mechanisms.
PREREQUISITES	B. Sc. degree
COURSE CONTENTS	- Radical Substitution Reactions at the Saturated C Atom - Nucleophilic Substitution Reactions at the Saturated C Atom - Elimination reactions - Substitution Reactions on Aromatic Compounds - Addition reactions - Oxidations and Reductions

RECOMMENDED READING	1. C.D. Nenițescu, *Chimie Organică*, ed. a VIII-a, vol I şi II, Ed. Didactică şi Pedagogică, Bucureşti, 1980. 2. F. Badea, *Mecanisme de Reacție in Chimia Organică*, ed. a II-a, Ed. Ştiințifică, Bucureşti, 1971. 3. F. Badea, F. Kerek, *Stereochimie*, Ed. Ştiințifică, Bucureşti, 1974. 4. H. Becker s.a., *Organicum*, Ed. Ştiințifică şi Enciclopedică, Bucureşti, 1982. 5. B.K. Carpenter, *Determination of Organic Reaction Mechanisms*, John Wiley&Sons, New York, 1984. 6. R. Bruckner, *Advanced Organic Chemistry. Reaction Mechanism*, Harcourt/Academic Press, San Diego, 2002.
TEACHING METHODS	Presentation

ASSESSMENT METHODS	Written
LANGUAGE OF INSTRUCTION	Romanian or english, on demand

COURSE TITLE	**FOOD CHEMISTRY**	CODE: CM4110

YEAR OF STUDY	I	SEMESTER	I	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	OC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. PROFESSOR AURELIA VASILE

OBJECTIVE OF THE COURSE	- The main objective of the course is to provide a systematic and updated amount of knowledge necessary and sufficient to guide students in food chemistry, an area of major importance to life and human health. - Developing the skills of practical application of theoretical concepts and experimental techniques, preparation of analysis report and accountability of its signature.
PREREQUISITES	Organic chemistry; Biochemistry.
COURSE CONTENTS	Part I: Fundamentals 1. General characteristics of food 2. Water in food. 3. Quality of raw materials and foodstuffs 4. Packaging and labelling of food 5. Food Preservation Part II: Types of food 6. Cereals and cereal products 7. Vegetables, fruits and derived products 8. Meat and meat preparations 9. Milk and milk products 10. Dietary fat 11. Sugar, glucose, honey and confectionery products

RECOMMENDED READING	1. Banu Constantin, *Tratat de chimia alimentelor*, ed. AGIR, Bucureşti, 2002. 2. Gligor Felicia Gabriela, Chimia alimentelor, Editura Alma Mater , Sibiu, 2004. 3. Mucete Daniela, *Chimia produselor agroalimentare* , 2005. 4. Miere Doina ,*Chimia şi igiena alimentelor* ,2002. 5. Socaciu Carmen, *Chimie alimentară*, 2003. 6. Segal Rodica, Barbu Irina, *Analiza senzorială a produselor alimentare*, E.T., Bucureşti, 1978.
TEACHING METHODS	Type classes will be interactive lecture using PowerPoint presentation of information accompanied by a large number of images suggestive themes lecture.

ASSESSMENT METHODS	Final score	50% continuous assessment seminar 50% final assessment course
	Course score	50% Assessment week 8: written exam 50% Assessment week16: written exam
	Terms	Minimum score for each form of assessment is 5
	Criteria	Achieving minimum performance standards of discipline.
	Forms	Written exam
LANGUAGE OF INSTRUCTION	Romanian language	

COURSE TITLE	**ENZYMATIC PROCESSES IN ENVIRONMENT AND FOOD**	CODE: CS4207

YEAR OF STUDY	I	SEMESTER	2	TYPE OF COURSE (CC-compulsory/OC-optional/EC-elective)	CC

LEVEL OF COURSE	NUMBER OF ECTS CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	ASSOC. PROFESSOR PHD. NECULAI – CĂTĂLIN LUNGU

OBJECTIVE OF THE COURSE	To transmit the main knowledge about enzymatic processes in environment and food. Description of the fundamentals of the biosynthesis and action mechanism of cellular and enzymatic systems, using the results of organically chemistry, biochemistry, industrial microbiology and bioengineering. To create the students ability to understand the processes for obtaining and using these products. At the end of this course the students should be able to apply this knowledge in the practical sphere and even research domains.
PREREQUISITES	Organically Chemistry, Biochemistry, Synthesis of Organically Compounds, Biotechnology
COURSE CONTENTS	Enzymes - general, international regulations. Biotechnological production of enzymes. Important industrial enzymes: amylase, β-galactozidaza, cyclodextrin-glucozil-transferase glucose-izomeraze, inulaze, lipase, pectinaze, proteases and several other enzymes. Immobilized enzymes: adsorption, covalent bonds, including a matrix encapsulation membrane, immobilized in a polymer network. Immobilized cells: adsorption, covalent linkages, inclusion in a matrix, encapsulation and flocculation. Enzyme biotransformation. Extraction and purification of enzyme biotechnology products. Enzymatic food products. Enzymatic processes in the environment.

RECOMMENDED READING	1. A. H. Scragg (editor) - Biotechnology For Engineers - Biological Systems in Technological Processes, John Wiley & Sons - Sheffield, England, l988. 2. U. Wiesmann, I. S. Choi, E.-M. Dombrowski – Fundamentals of Biological Wastewater Treatment, Wiley-VCH, 2007. 3. M. Larpent-Gourgand şi J. J. Sanglier - Biotechnologies - Principes et méthodes, Doin Editeurs - Paris, France, l992 4. Ş. Jurcoane (coordonator) – Tratat de Biotehnologie, vol. I, Editura Tehnică, Bucureşti, 2004. 5. C. Banu – Biotehnologii în industria alimentară, Editura Tehnică, Bucureşti, 2000. 6. N.-C. Lungu – Fundamente ale bioindustriei – Bioprocesele la scară mare, Editura Performantica, Iaşi 2008.
TEACHING METHODS	Oral and writing presentation and seminarisation. Working in laboratory of organically chemistry and biochemistry.

ASSESSMENT METHODS	Conditions: - a full activity in laboratory and cours, - minim 5 for laboratory activity. Criteria: - the results obtained in respective semester. Forms: - writing and /or oral presentation. Final grade calculation: 40 % semestrial seminar and laboratory activity, plus 60 % examen note (30 % first sesion, plus 30 % second sesion).
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**POLLUTANTS**	CODE: CN4250

YEAR OF STUDY	I	SEMESTER	2	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PH.D. LECTURER MIRELA GOANȚĂ

OBJECTIVE OF THE COURSE	Deepen the students knowledge of inorganic pollutant substances and chemical reactions that can participate, knowing the sources of pollution of various pollutants, highlighting how different emissions can be controlled pollutants.
PREREQUISITES	Chemistry of non-metals, Metal chemistry bloc "s" and "p" , Transition metal chemistry
COURSE CONTENTS	Classification of pollutants. Greenhouse gas emissions. CO - sources of pollution, emissions control and physiological action of carbon monoxide. Nitrogen oxides - pollution sources, emission control and physiological. Sulfur oxides, hydrogen sulfide - sources of pollution, emissions control and physiologic action. Halogen compounds having a pollutant. Phosphorus, arsenic or their compounds having a pollutant - sources of pollution, emissions control and physiologic action. Pollutants formed in photochemical processes. Classification of metals according to the form occurring in the environment of) global copper cycle (atmosphere - hydrosphere-lithosphere) b) global calcium cycle (atmosphere - Hydrosphere - lithosphere) c) the global cycle of mercury (air - Hydrosphere - lithosphere). Pollution by heavy metals (Cd, Cr, Cu, Hg, Pb, Ni, Sn, Zn)

RECOMMENDED READING	1. G. Fellenberg, *„Chemie der Umweltbelastung*" ,Teubner Stuttgart, 1997 2. Roy M. Harrison, *„Pollution-Causes, Effects, and Control"*, The Royal Society of Chemistry, 1996 3. C.Janiak, Klapötke, Meyer, *„Moderne Anorganische Chemie"*, De Gruyter, 2003 4. W. Van Loon, Stephen J. Duffy, *„Environmental Chemistry-a global perspective"*, Oxford University Press, 2005 5. Detlev Möller, *„Luft"*, Walter de Gruyter , Berlin New York, 2003 6. John H. Seinfeld, Spyros N. Pandis, *„Atmospheric Chemistry and Physics. From Air Pollution to Climate Change"*, John Wiley & Sons, 1998
TEACHING METHODS	Lecture, interactiv methods, case study

ASSESSMENT METHODS	Partial, during the semester (50%) + written examination (50%)
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**ANALYTICAL TOXICOLOGY**	CODE: CA4219

YEAR OF STUDY	I	SEMESTER	2	TYPE OF COURSE (CC-compulsory/OC-optional/EC-elective)	OC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PH. D ASSISTANT ALIN CONSTANTIN DÎRȚU

OBJECTIVE OF THE COURSE	This course aims at systematical investigation of the analysis of complex matrices (different environmental matrices, biological samples, food items, etc) in order of quantifying selected contaminants. It also aims at familiarizing of students regarding each step of the analysis methodology, namely: different sampling techniques, sample preparation, selected analysis techniques, interpretation of the results. The students will receive information in order to be able to correlate the chemical nature of a certain contaminant class with the existing possibilities for analysis methodologies.
PREREQUISITES	General chemistry. Analytical Chemistry. Toxicology
COURSE CONTENTS	Toxicology: definition, aims, relations with other disciplines. Sampling and specific sample preparation. Correlations between physico-chemical proprieties – separation methodologies/analysis. Analysis schemes. Separation and identification of selected toxic compounds using different methodologies, namely: GC, CSS, CSI, HPLC, electrophoresis, etc. Spectrometric methodologies (AAS, ICP-MS, IR and UV-VIS) applied on analysis of selected toxic compounds. Electrochemical analysis methodologies applied on determination of selected contaminants. Analysis of inorganic contaminants from various matrices. Analysis of pesticides and rodenticides. Analysis of selected medicaments. Analysis of selected food additives.

RECOMMENDED READING	1. Stahr H.M., Analytical methods in toxicology, J. Willey& Sons, 1991 2. Flanagan R.J., Basic analytical toxicology, WHO, 1995 3. Hodgson E., A textboock of modern toxicology, J. Willey& Sons, 2004 4. Cotrău M., Butuc A., Toxicologie minerală, Ed. Ministerul Industriei Chimice, 1981 5. Roman L., Teste analitice rapide, Ed Tehnică,1994
TEACHING METHODS	Lecture

ASSESSMENT METHODS	2x20% of the final grade for two written tests from the practical applications (weeks 7 and 15 of the semester), and 2x30% for two written exams from the content of the lectures (weeks 8 and 16).
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**MANAGEMENT OF SCIENTIFIC RESEARCH CERTIFIED ISO 9001**	CODE: CA5330

YEAR OF STUDY	II	SEMESTER	3	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	**6**

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. PROFESSOR EVELINI POPOVICI

OBJECTIVE OF THE COURSE	The course is addressed to Master Degree students and aims the improvement of their training as future researchers, which are expected to work within "Large Europe" and inssures them an equilibrated knowledge, able to direct them to the top fields of the modern scientific research, based on young people creativity, use of high qualified people and durable development.
PREREQUISITES	All chemistry subjects
COURSE CONTENTS	Quality of the research. Management-art and science.The principles of research-growth-innovation in art of management. Creativity concept. Methods of creativity. The planning and organization of the research-growth activities. Strategic audit. Staffing, Leading and Prevention Control of research activities. Foresight. Management of innovation. Projects management.
SEMINARS CONTENTS	Creativity concept. Demonstrative and illustrative presentations learning by applying well established algorithms. Interactive methods.

RECOMMENDED READING	- Vinkler, Peter, 1986,*Management system for a scientific research institute based on the assessment of scientific publications*, Research Policy, Elsevier, vol. 15(2), pages 77-87, April. - I. Chein, *The field of Action Research*, 2006, Sage Publications, California - O.Plesa, F.Ciote, *Inovarea si sfidarile schimbarii*, Editura Multimedia, 1996 - Legea nr.324/8 iulie privind Cercetarea stiitifica si dezvoltarea tehnologiei ; - HG nr.328/28 aprilie 2005 privind Cercetarea de Excelenta. - S.Ottosson, Knowledge of Management, *J. Technoinovation*, 23 (2006), 87-104. - M.Ward, *Managementul -50 de tehnici esentiale*; Editura Class, Bucuresti, 1997. - Curaj A., s.a. – *Practica managementului proiectelor*, Editura Economică, Bucureşti, 2003. - Dumitrache I., Scarlat C., Munteanu R., Curaj A. – *Managementul centrelor de cercetare ştiinţifică*, Editura Economică, Bucureşti, 2003. - Bodea C. (coord). - *Managementul proiectelor*, Editura Inforec, Bucureşti, 2000. - M. Rădulescu – *Metodologia cercetării ştiinţifice*, EDP Bucureşti, 2006
TEACHING METHODS	Teaching methods: attractive exposure, heuristic conversation, demonstrative and illustrative presentations learning by applying well established algorythms, interactive methods.

ASSESSMENT METHODS	50% Continuos evaluation seminars 50% Final evaluation course 50% Evaluation in the 8-th week 50% Evaluation in the 16-th week Minimum mark of 5 at each evaluation form Fulfilment of minimum standards of performance in management Area. Writing examination
LANGUAGE	Romanian

COURSE TITLE	**SYNTHESIS AND CHARACTERIZATION OF POLYPEPTIDES**	CODE: CO5327

YEAR OF STUDY	II	SEMESTER	3	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER OF SCIENCE	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PH.D. PROFESSOR GABI DROCHIOIU

OBJECTIVE OF THE COURSE	This course aims at introducing students in the modern methods for polypeptide synthesis and characterization using Merrifield's techniques, RP-HPLC, mass spectrometry, circular dichroism and others. ways and methods of investigation of nucleic acids and proteins. The students should use internet and recommended bibliography and the lab devices to isolate, purify and characterize the peptides and proteins. They also must elaborate reviews and documentation files.
PREREQUISITES	Organic Chemistry, Biochemistry, Inorganic Chemistry, Analytical Chemistry
COURSE CONTENTS	Amino acids, peptide and proteins. Structure, molecular weight, amino acid sequence of proteins. NMR and X ray analyses for determining the tridimensional structure. Edmann method for determining amino acid sequence. Immunological techniques of proteins. Solid phase synthesis (Merryfield) of peptides. HPLC. Circular dichroism. Atomic force microscopy. Paper protein electrophoresis; PAGE of proteins; DataBase search.

RECOMMENDED READING	8. Lehninger, A. L. *Biochimie*, vol. I and II, Edit. Tehnică, Bucureşti, 1987, 1992. 9. Cojocaru, D. C., *Biochimia proteinelor şi acizilor nucleici*, Ed. Corson, Iaşi, 2003. 10. Nelson, D. L., Cox, M. M. *Lehninger Principles of Biochemistry*, Fourth Edition. W. H. Freeman & Comp., New York, 2004. 11. Berg, J. M., Tymoczko, J. L., Stryer, L. *Biochemistry*, 5 ed., W. H. Freeman and Co., New York, 2002. 12. Kellner, R., F., Lottspeich, Meyer, H. E. *Microcharacterization of proteins*. Wiley - VCH, Weinheim, New York, Toronto, etc. 1999. 13. N. Gheorghiță, Iacobovici, A. Jerca, L. Popovici, I. *Biochimie medicală*. Univ. Med. Farm. Iași, 1996. 14. Zubay, G. *Biochemistry*, Addison-Wesley Publ. Comp., Massachusets, California, London, Amsterdam, Ontario, Sydney, 1983. 8. Artenie, V.G., Tănase Elvira, *Practicum de biochimie generală*, Ed. Univ. "Al. I. Cuza" Iași, 1981. 9. Gross M. L. Mass spectrometryin the biological sciencesKluver, London, 1992. 10. M. Devlin, Textbook of biochemistry, John Willey and Sons, New York, Chichester, Brisbane, Toronto, Singapore, 1986. 11. Drochioiu, G., I. Mangalagiu, I. Druță – Biochimie generală. Edit. Demiurg, Iași, 2002.
TEACHING METHODS	Lectures, seminars, lab works and demonstrations

ASSESSMENT METHODS	Lab works, reviews, documentation works; marks from 1 to 10 for each activity; 20 % for the review; 30 % lab works; 50 % written examination; Course attandance is essential.
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**SPECIAL CHAPTERS OF HETEROCYCLIC COMPOUNDS**	CODE: CO5323

YEAR OF STUDY	II	SEMESTER	3	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. PROFESSOR IONEL MANGALAGIU

OBJECTIVE OF THE COURSE	**Aims**: Basically knowledge's concerning Synthesis, Structure, Reactivity and Practical Applications of Some Pyrimidine Derivatives **Objectives**: At the end of the course students will has solid knowledge concerning synthesis (via ylide derivatives), structure, reactivity and biological activity of some pyrimidine derivatives.
PREREQUISITES	Organic Chemistry; Biochemistry
COURSE CONTENTS	I. Introduction II. Practical application of Pyrimidine derivatives III. Synthesis, structure and reactivity of pyrimidininium ylides IV. Pyrimidinium ylides with saturated carbanion IV. Pyrimidinium ylides with unsaturated carbanion V. Pyrimidinium ylides with cyclic carbanion
RECOMMENDED READING	**Monographs** Johnson, A.W.: *"Ylid Chemistry"*, Academic Press, New York, London, **1966**. Zugrăvescu, I.; Petrovanu, M.: *"N-Ylid Chemistry"*, Mc Grow-Hill, London, **1976**. Padwa, A.*:" 1,3-Dipolar Cycloaddition"* , John Wiley, New York, vol.1,2, **1984**. Zugrăvescu, I.; Petrovanu, M: "*Cicloadiţii 3+2 dipolare"*, Ed. Acad. R.S.R., Bucureşti, **1987**. Houben-Weyl: "*Methoden der Organischen Chemie*". Organische Stickstoff-Verbindungen mit einer C,N- Doppelbbildung, Georg varlag, Stuttgart-N.Y., E.14-b, 99-1546, **1990**. *** Advances in HETEROCYCLIC CHEMISTRY, **vol 75**, Edited by A. KATRITZKY, ACADEMIC PRESS, San Diego London Boston New York, **2000**. Kenner, W.; Todd, A.R.:" *Heterocyclic Compounds*", Ed. Elderfield, R.C., John Willey&Sons, New York**, vol. 6**, p.234, **1961**. Brown, D.J.:" *The Pyrimidines*", în "*The Chemistry of Heterocyclic Compounds*", Ed. Weissberger, A., John Wiley, New York, vol. **16**, **1962**. Katritzky, A.R.; Lagowski, J.N.: "*Advances in Heterocyclic Chemistry*", Academic Press, New York, London, vol. **1**, **1963**. Katritzky, A.R.; Pozharskii, A.F,: "*Handbook of Heterocyclic Chemistry*", Pergamon Press, New York, **2000**. **Katritzky, A. R. and Rees, Ch. W. (editors), volume 5, 1998**, *Comprehensive heterocyclic chemistry in 8 volumes (CD-ROM version)*. Pergamon Press; + **scientific papers concerning topic betwen 200-2009**
TEACHING METHODS	Mixed: modern and classics

ASSESSMENT METHODS	Conditions: Practical works and seminarium are compulsory. Evaluation: Written examination during semester Written examination at the final of semester Marks: scale: 1 to 10 40 % - evaluation during semester 60%- final exam
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**FINE ORGANIC SYNTHESIS I**	CODE: CO5325

YEAR OF STUDY	II	SEMESTER	3	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER OF SCIENCE	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. ASSOCIATE PROFESSOR MIHAIL- LUCIAN BÎRSĂ

OBJECTIVE OF THE COURSE	This course is intended for students who have already had substantial exposure to organic chemistry. It's purpose is to familiarize the student with laboratory techniques.
PREREQUISITES	B.Sc. degree
COURSE CONTENTS	Manipulation of laboratory glassware, laboratory instruments, and purification techniques of heterocyclic compounds

RECOMMENDED READING	1. C. D. Nenitescu, Chimie Organica, Editura Didactica si Pedagogica, Bucuresti, 1980. 2. R. Bruckner, Advanced Organic Chemistry – Reaction Mechanisms, Academic Press, 2002. 3. L. M. Harwood, C. J. Moody, and J. M. Percy, Experimental Organic Chemistry, Blackwell Science, Oxford, 1999. 4. Becker et al., Organicum, Editura Stiintifica si Enciclopedica, Bucuresti, 1982. 5. A. I. Vogel, Practical Organic Chemistry, Longmans, London, 1961.
TEACHING METHODS	Presentation

ASSESSMENT METHODS	Written
LANGUAGE OF INSTRUCTION	Romanian or english, on demand

COURSE TITLE	**METHODS FOR INVESTIGATION OF ORGANIC REACTION MECHANISMS**	CODE: CO5423

YEAR OF STUDY	II	SEMESTER	I	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER OF SCIENCE	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. ASSOCIATE PROFESSOR MIHAIL- LUCIAN BÎRSĂ

OBJECTIVE OF THE COURSE	This course is intended for students who have already had substantial exposure to organic chemistry. Its purpose is to familiarize the student with the stereochemical aspects of organic reactions and with the techniques available for studying reaction mechanisms in organic chemistry.
PREREQUISITES	B.Sc. degree and Advanced Organic Chemistry course
COURSE CONTENTS	1. Introduction. Types of mechanisms in organic chemistry. 2. Thermodynamic and kinetic aspects of organic reactions. 3. Determination of organic reaction mechanisms using kinetic experimental methods: the influence of substitutents, solvents and catalysts on organic reactions; prototropic transformations; isotop effects. 4. Determination of organic reaction mechanisms using non-kinetic experimental methods: isotopic labelling; the nature of the reaction products; crossover experiment; direct detection of reactive intermediates. 5. Chirality and stereochemistry.

RECOMMENDED READING	6. C.D. Nenițescu, *Chimie Organică*, ed. a VIII-a, vol I şi II, Ed. Didactică şi Pedagogică, Bucureşti, 1980. 7. F. Badea, *Mecanisme de Reacție in Chimia Organică*, ed. a II-a, Ed. Științifică, Bucureşti, 1971. 8. F. Badea, F. Kerek, *Stereochimie*, Ed. Științifică, Bucureşti, 1974. 9. H. Becker s.a., *Organicum*, Ed. Științifică şi Enciclopedică, Bucureşti, 1982. 10. B.K. Carpenter, *Determination of Organic Reaction Mechanisms*, John Wiley&Sons, New York, 1984. 6. R. Bruckner, *Advanced Organic Chemistry. Reaction Mechanism*, Harcourt/Academic Press, San Diego, 2002.
TEACHING METHODS	Presentation

ASSESSMENT METHODS	Written
LANGUAGE OF INSTRUCTION	Romanian or english, on demand

COURSE TITLE	**ORGANIC STRUCTURAL ANALYSIS**	CODE: CO5428

YEAR OF STUDY	II	SEMESTER	4	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. LECTURER RAMONA ANTOANETA DĂNAC

OBJECTIVE OF THE COURSE	Understanding and use of physical methods (IR, NMR, MS) in the elucidation of the organic compounds structure and conformation.
PREREQUISITES	Fundamentals of organic chemistry Chemistry of hydrocarbons and single functional group compounds Organic chemistry of multiple functional group compounds Basic Structural Organic Analysis
COURSE CONTENTS	^{1}H-NMR: Analyses of high resolutions ^{1}H-NMR spectra. Selective spin decoupling. Double resonance. Deuterium labelling. Influence of dynamic effects on ^{1}H-NMR spectra. Application of NMR-spectroscopy in organic chemistry. ^{13}C-NMR-Spectroscopy: Chemical shift. Spin-spin $^{2}J_{CH}$ si $^{3}J_{CH}$ coupling. Spin decoupling techniques. Mono and bidimensional NMR: APT, DEPT, NOE, COSY, HETCOR, NOESY, ROESY, HMQC /HMBC Mass spectroscopy: Interpretation of mass spectra of some organic compounds.

RECOMMENDED READING	1. E. de Hoffmann, V. Stroobant, Mass Spectrometry. Principles and Applications (3rd edition), John Wiley & Sons, Ltd, 2007. 2. R. M. Silverstein, F. X. Webster, D. J. Kiemle, Spectrometric Identification of Organic Compounds (7th edition), John Wiley & Sons, Ltd, 2007. 5. H. Friebolin, Basic One- and Two-Dimensional NMR Spectroscopy (4th edition), Wiley VCH, 2005. 4. P. Crews, J. Rodriguez, M. Jaspars, Organic Structure Analysis, 1998, Oxford University Press, UK.. 5. F. Albert, N. Barbulescu, C. Holszky, C. Greff, Analiza chimica organica. Editura tehnica, Bucuresti, 1970. 6.R. Danac, M. Roman, Probleme de analiza structurala organica, Ed Sedcomlibris, 2006, Iasi. 7.Organic Structure Elucidation, Bradley D. Smith, University of Notre Dame, Indiana, USA, 1998. 8.Integrated Spectral Data Base System for Organic Compounds, T. Saito, N. Wasada, K. Someno, S. Kinugasa, National Institute of Advanced Industrial Science and Technology, Tsukuba, Ibaraki, Japan, 2004.
TEACHING METHODS	Lecture, conversation, demonstration

ASSESSMENT METHODS	Examination during semester, writing, oral at request
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**FINE ORGANIC SYNTHESIS II**	CODE: CO5426

YEAR OF STUDY	II	SEMESTER	4	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER OF SCIENCE	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. ASSOCIATE PROFESSOR MIHAIL- LUCIAN BÎRSĂ

OBJECTIVE OF THE COURSE	This course is intended for students who have already had substantial exposure to organic chemistry. Its purpose is to familiarize the student with laboratory techniques
PREREQUISITES	B.Sc. degree
COURSE CONTENTS	Manipulation of laboratory glassware, laboratory instruments, and purification techniques of heterocyclic compounds

RECOMMENDED READING	1. C. D. Nenitescu, Chimie Organica, Editura Didactica si Pedagogica, Bucuresti, 1980. 2. R. Bruckner, Advanced Organic Chemistry – Reaction Mechanisms, Academic Press, 2002. 3. L. M. Harwood, C. J. Moody, and J. M. Percy, Experimental Organic Chemistry, Blackwell Science, Oxford, 1999. 4. Becker et al., Organicum, Editura Stiintifica si Enciclopedica, Bucuresti, 1982. 5. A. I. Vogel, Practical Organic Chemistry, Longmans, London, 1961.
TEACHING METHODS	Presentation

ASSESSMENT METHODS	Written
LANGUAGE OF INSTRUCTION	Romanian or english, on demand

COURSE TITLE	**REACTIVITY OF COORDINATIVE COMPOUNDS**	CODE: CN5320

YEAR OF STUDY	II	SEMESTER	3	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. LECTURER CARMEN MÎȚĂ

OBJECTIVE OF THE COURSE	-the students must have the deep knowledge about the correlation between structure and reactivity of the coordinative compounds; - to use the thermodynamic and kinetic parameters in study of the chemical processes; -to have the knowledge on the dependence of the reaction mechanism to the chemical composition, structure and nature of phases
PREREQUISITES	Advanced Inorganic Chemistry, Inorganic Structural Analysis
COURSE CONTENTS	Physico-chemical and structural parameters of the coordinative compounds. Thermodynamic and kinetic aspects of the reactivity. Reactivity of the coordinate ligands. Effect of the mutual interaction between ligands – trans effect and cis effect. Template reactions. Acido - basic Lewis reactivity. Redox reactivity. Study of the redox reactions by the "inner sphere" and "outer sphere" mechanisms and of the photochemical reactions. Catalytic activity of the coordinative compounds.

RECOMMENDED READING	J.A. McCleverty, T.J. Meyer, "Comprehensive Coordination Chemistry", Elsevier, 2003 D. Katakis, G.Gordon, "Mechanisms of Inorganic Reactions", John-Willey, 1987 I. Berdan „Reactivitate şi mecanisme de reacție în chimia anorganică", Ed. Universității „Al.I. Cuza" Iaşi, 2006 J.E. Huheey „ Inorganic Chemistry. Principles of Structure and Reactivity." Harper-Row Publisher, New York, 1990. F.A. Cotton, G. Wilkinson, C.A. Murillo, M. Bochmann „Advanced Inorganic Chemistry", Sixth Ed. , John Wiley &Sons, Inc., New York, 1999. D.F. Shriver, P.W. Atkins, C.H. Langford „Chimie Anorganică" Ed. Tehnică, Bucureşti, 1998
TEACHING METHODS	Lecture, heuristic conversation, case study

ASSESSMENT METHODS	Form: Mixt (oral, written) Final grade formula: 50% (25% laboratory + 25% seminar) + 50% (final exam: 25% E1 exam week + 25% E2 exam week) Conditions: minimum grade for all forms of evaluation : 5.00
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**COORDINATION CHEMISTRY OF F-BLOCK ELEMENTS AND SUPERHEAVY ELEMENTS**	CODE: CN5325

YEAR OF STUDY	II	SEMESTER	3	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. ASSOCIATE PROF. KARIN POPA

OBJECTIVE OF THE COURSE	To train postgraduate students on f-block- and transactinides elements terminology. To form a relevant overview on the nuclear, optical, electrical and magnetic properties of the f-block elements and their compounds. To develop the correlation capacity between the position of these elements in the periodic table and their radioactive properties.
PREREQUISITES	Radiochemistry, General Inorganic Chemistry, Metals.
COURSE CONTENTS	General aspects of the f-block and superheavy elements (definitions, occurrence and history of the elements, periodicity in f-block, ionic radii and coordination number, electronic and magnetic properties, oxidation states, relationship with the pre-transitional and transitional elements). Lanthanoides: extraction and separation, metallic state, oxidation state, solution chemistry, binary compounds, coordination compounds, applications. Actinoids: occurrence, transuranium elements (synthesis and applications), metallic state, oxidation state, metals, solution chemistry, binary compounds, coordination compounds. Superheavy elements. General aspects.

RECOMMENDED READING	(1) F. Bunus, ‚Actinidele si aplicatiile lor', ed. Stiintifica si enciclopedica, Bucuresti, 1981. (2) A.J. Freeman, C. Keller, 'Handbook on the Physics and Chemistry of the Actinides', North Holland Amsterdam, 1985. (3) G.T. Seaborg, W.D. Loveland, 'The Elements Beyond Uranium', Willey Interscience, New York, 1990. (4) S.A. Cotton, 'Lanthanides and Actinides', MacMillan, London, 1991. (5) G. Chopin, J. Rydberg, J.O. Liljenzin 'Radiochemistry and Nuclear Chemistry', Butterwoth-Heinemann, New York, 1995. (6) A. Cecal, A. Gulea, 'Chimia lantanoidelor si actinoidelor. Prelegeri', ed. Universitatii de Stat, Chisinau, 2000. (7) M. Schëdel, 'The Chemistry of Superheavy Elements', Springer, Heidelberg, 2003.
TEACHING METHODS	Classroom lectures. Seminars. Laboratory sessions. Homework.

ASSESSMENT METHODS	Exam
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**INORGANIC COMPOUNDS WITH SPECIAL PROPERTIES**	CODE: CN5322

YEAR OF STUDY	II	SEMESTER	3	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER OF SCIENCE	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD ASSOCIATE PROFESSOR DUMITRU GÂNJU

OBJECTIVE OF THE COURSE	Students will be able to correlate physical properties of some inorganic compounds with stereochemical environment in crystals and crystals defects.
PREREQUISITES	Inorganic chemistry (general), chemistry of metals, coordination chemistry
COURSE CONTENTS	1.INORGANIC COMPOUNDS IN THE ELECTRONICS INDUSTRY 2.FAST ION CONDUCTORS 3.SUPERCONDUCTING OXIDES 4. MAGNETIC MATERIALS

RECOMMENDED READING	1. I.Teoreanu ş.a., "Introducere în ştiinţa materialelor anorganice" Ed.Tehnică,Bucureşti,1987 2.D.Gânju,"Substanţe tehnice anorganice", Ed.Univ."Al.I.Cuza" Iaşi1997 3. I.I.Nicolaescu,V.G.Canţer,"Fizica corpului solid", Chişinău,1991 4. Handbook of preparative Inorganic Chemistry, Edited by G.Bauer,A.Press, London 1963
TEACHING METHODS	Lecturer, interactive teaching methods , case study

ASSESSMENT METHODS	Written examination
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**QUANTITATIVE ANALYSIS OF STRUCTURAL DATA - PROPERTIES INTERDEPENDENCE FOR COORDINATION COMPOUNDS**	CODE: CN5323

YEAR OF STUDY	II	SEMESTER	3	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD ASSOCIATE PROFESSOR COZMA DANUT

OBJECTIVE OF THE COURSE	The presentation of goals of Statistical Procedures, for the identifying and defining objectives in terms of desired changes in student behaviour : (1) What should students be like at the end of the learning experience?(2)In other words, what kind of learning product is being sought? (3) What knowledges and understanding should the students possess?(4) What skills should they be able to display?(5) What interests and attitudes should they have developed? (6)What changes in habits of thinking, feeling and doing should have taken place
PREREQUISITES	Advanced inorganic chemistry, Special inorganic syntheses, Mathematical analysis; Linear algebra and differential equations.
COURSE CONTENTS	The probabilities are a representation of probabilistic concepts in formal terms—that is. **Descriptive Statistics** are used to describe the basic features of the data gathered from an experimental study in various ways; with **inferential statistics**, on try to reach conclusions that extend beyond the immediate data alone. For instance, on use inferential statistics to try to infer from the sample data what the population might think. On use inferential statistics to make judgments of the probability that an observed difference between groups is a dependable one or one that might have happened by chance in this study. Most of the major inferential statistics come from a general family of statistical models known as the general linear model.This includes the t-test, Analysis of Variance (ANOVA), Analysis of Covariance (ANCOVA), regression analysis, and many of the multivariate methods like factor analysis, multidimensional scaling, cluster analysis, discriminant function analysis, and so on.

RECOMMENDED READING	Various techniques that are commonly used are classified as: -Graphical displays of the data in which graphs summarize the data or facilitate comparisons. -Tabular description in which tables of numbers summarize the data. -Summary statistics (single numbers) which summarize the data.
TEACHING METHODS	The concept of formative evaluation not be restricted to the curriculum development.There are two major ways that the teaching methods can facilitate student motivation: (1) by providing immediate, attainable goals toward which to work; (2) by providing knowledge of learning progress.

ASSESSMENT METHODS	The identifing the learning outcomes to be tested; the procedure for selecting test content for a standardised achievement.There are four major steps in the diagnosis and the remediation of learning difficulties: (1)Determining which student are having learning difficulty;(2) Determining the specific nature of the learning difficulty; (3) Determining the factors causing learning difficulties; (4) Applying appropriate remedial procedures
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**INORGANIC (NANO)POROUS STRUCTURES**	CODE: CM5305

YEAR OF STUDY	II	SEMESTER	3	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	OC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. PROFESSOR AURELIA VASILE

OBJECTIVE OF THE COURSE	Developing skills for study and research on inorganic structures nanoporous – advanced materials and their applications.
PREREQUISITES	Inorganic chemistry; Organic chemistry; Analytical chemistry.
COURSE CONTENTS	Part I. Inorganic microporous structures: zeolites and zeotypes. I. Zeolites and zeotypes - advanced materials; II. The structure of zeolites and zeotypes; III. Synthesis of zeolites and zeotypes; IV. The properties of zeolites and related materials; V. Applications of zeolites and related materials Part II: Inorganic mesoporous structures. VI. Mesoporous inorganic structures - a new class of advanced materials; VII. Structure of the mesoporous materials; VIII. Synthesis of the mesoporous material, IX. Applications of mesoporous materials. Part III: Methods for characterization of inorganic nanoporous structures;X. Methods for characterization of inorganic nanoporous structures.

RECOMMENDED READING	1. A. Vasile, N. Bâlbă, *Zeoliții în adsorbție*, Edit. Cermi, Iaşi, 2000. 2. *State of the art overview and forecasts based on existing information of nanotechnology in the field of nanomaterials* - Willems and van den Willdenberg, 2004. 3. *Research opportunities for materials with ultrafine microstructures*, NMAB-454, National Academy Press 4. *Nanomaterials – the driving force*, M. J. Pitkethly ISSN, Elsevier, 2004. 5. *Nanostructures and Nanomaterials, Synthesis, Properties and Applications*, G.Cao, Imperial College Press, 2004.
TEACHING METHODS	Type classes will be interactive lecture using PowerPoint presentation of information accompanied by a large number of images suggestive themes lecture. The hours of the workshop will be discussion based on information taught the course and scientific papers on the themes.

ASSESSMENT METHODS	Final score	50% continuous assessment seminar 50% final assessment course
	Course score	50% Assessment week 8: written exam 50% Assessment week16: written exam
	Terms	Minimum score for each form of assessment is 5
	Criteria	Achieving minimum performance standards of discipline.
	Forms	Written exam
LANGUAGE OF INSTRUCTION	Romanian language	

COURSE TITLE	**ADVANCED BIOINORGANIC CHEMISTRY**	CODE: CN5424

YEAR OF STUDY	II	SEMESTER	4	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. PROFESSOR ALEXANDRA RALUCA IORDAN

OBJECTIVE OF THE COURSE	This course has the purpose to provide the students with those knowledges that will allow them to read critically papers concerning bioinorganic issues and to join with little difficulties research groups dealing with bioinorganic chemistry.
PREREQUISITES	Students must possess a basic knowledge of biochemistry and of coordination chemistry
COURSE CONTENTS	The frontiers of bioinorganic chemistry. Roles of metalloproteins in cells: choice, uptake and assembly of metal containing units in biology. Tuning of metal properties by proteins to obtain specific functions Metal protein analysis according to the metal: Iron, Copper, Molybdenum, Cobalt, Zinc and other metals. Elements of design, synthesis and study of syntetic metalloreceptors or the selective recognition of biological substrates.

RECOMMENDED READING	1) Bertini I., Gary H. B., Stiefel E. I., Valentine J. S., Biological Inorganic Chemistry, University Science Books, 2006 2) Palamaru M. N., Iordan Al. R., Popa K., BazeleChimie bioanorganice. Lucrări practice si aplicații, Editura Tehnopress, Iaşi, 2004. 3) Palamaru M. N., Iordan Al. R., Cecal Al., Chimie bioanorganică generală, Editura Universității "Al. I. Cuza, Iaşi, 1998. 4) Palamaru, M.N., Iordan, Al.R., Cecal, Al., Chimie bioanorganică şi metalele vieții, Editura BIT, Iaşi, 1997. 5) Lippard S.J., Berg J.M. - Principes de biochimie minérale, De Boeck Université, 1997 6) Blondin G., Girerd J.J., Meunier B. - Chimie bioinorganique, Ecole Polytechnique Palaiseau, France, 1996.
TEACHING METHODS	Lectures, Collective problem solving

ASSESSMENT METHODS	Written examination (50%) and quizzes to assess practical skills (50%)
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**SYNTHESIS OF INORGANIC MATERIALS**	CODE: CN5421

YEAR OF STUDY	II	SEMESTER	4	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PROFESSOR PHD. AUREL PUI

OBJECTIVE OF THE COURSE	Developing students skills to apply theoretical principles and experimental techniques for the synthesis and characterization of inorganic materials with applications in science and engineering
PREREQUISITES	Inorganic structural analysis Special inorganic synthesis
COURSE CONTENTS	Inorganic materials science and engineering (crystalline solids, amorphous solids, melts and solutions, liquid crystals, etc.); theory crystallization (crystal growth, kinetics of crystallization) phase transformations. Equilibrium diagrams. Thermal analysis preparation, separation and purification of inorganic materials, development of the main types of inorganic materials.)

RECOMMENDED READING	1. Derek Woollins, *Inorganic Experiments*, VCH Verlagsgessellschaft mbH, D-69451, Weinheim, Federal Republic of Germany, 1994. 2. Materials syntheses: a practical guide, U. Schubert, N. Husing. R. M. Laine, Berlin ; London : Springer, 2008. 3. John N. Lalena, David A. Cleary, Everett E. Carpenter, Nancy F. Dean, A, INORGANIC MATERIALS; SYNTHESIS AND FABRICATION, JOHN WILEY & SONS, INC., PUBLICATION, 2008 4. K. Najamoto, *Infrared and Raman Spectra of Inorganic and Coordination compounds*, 5th Edition, John Wiley and Sons, Ltd, 1997. 5. A.B.P. Lever, *Inorganic Electronic Spectroscopy*, Elsevier, Amsterdam, 1968.
TEACHING METHODS	Lecture course, seminar and laboratory.

ASSESSMENT METHODS	50% writing examen + 50 % seminar and laborator.
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**RADIOCHEMICAL METHODS IN THE STUDY OF THE COORDINATION COMPOUNDS**	CODE: CN5426

YEAR OF STUDY	II	SEMESTER	4	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. ASSOCIATE PROFESSOR KARIN POPA

OBJECTIVE OF THE COURSE	To train postgraduate students on radiochemical methods. To acquire theoretical knowledge and practical skills in using radioactive substances and methods in the inorganic and coordination chemistry. To acquire a due knowledge and understanding on how radioactivity could be used in the inorganic chemistry.
PREREQUISITES	Radiochemistry, Chemistry of the f-block elements and superheavy elements.
COURSE CONTENTS	Radioisotopes in environment. Sources of radiations. Radioactive pollution. Radioactive properties. Interaction of radiation with the substance. Detection and measurement of low-level radiations, specific to the environment. Radioanalytical methods based on detection of natural radioactivity. Radioanalytical methods based on activation process. Principles of activation analysis. Neutron activation analysis (NAA). Neutron sources. Activation products (stable and active). Radioanalytical methods based on isotopic labeling: Isotopic dilution. Substoichiometric analysis. Radioimmunoassay. Inverse dilution. Methods using stable isotopes. Elucidation of reaction mechanisms by using radioisotopes. Radiochemical methods using chemical reagents: Radiochromatography. Radiometric titration. Radioindicators. Isotopic substitution. Applications: Industrial applications (in metallurgy, oil industry, food analysis, etc.). Medical diagnosis and therapeutical applications of radioisotopes. Radioecology. Dating methods.

RECOMMENDED READING	(1) A.N. Nesmeionov, V.I. Borenov, 'A guide to Practical Radiochemistry', Mir Publishers, Moscow, 1984. (2) T. Nascutiu, ,Metode radiochimice de analiza', ed. RSR, Bucuresti, 1973. (3) J. Tolgzessz, E. Bujdoso, 'Handbook of Radioanalytical Chemistry', CRC Press, 1991. (4) G. Chopin, J. Rydberg, J.O. Liljenzin 'Radiochemistry and Nuclear Chemistry', Butterwoth-Heinemann, New York, 1995. (5) C.H. Oh, 'Hazardous and radioactive waste treatment technologies handbook', CRC Press, Boca Raton, 2001. (6) K. Popa, D. Humelnicu, Al. Cecal, 'Radioactivitatea mediului înconjurător', ed. MatrixRom, Bucureşti, 2005.
TEACHING METHODS	Classroom lectures. Laboratory sessions. Homework.

ASSESSMENT METHODS	Exam
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**INORGANIC MATERIALS FOR ENERGY CONVERSION**	CODE:CN 5427

YEAR OF STUDY	II	SEMESTER	4	TYPE OF COURSE (CC-compulsory/OC-optional/ EC-elective)	**CC**

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	ASSOCIATE PROFESSOR PHD. ALEXANDROAEI MARIA

OBJECTIVE OF THE COURSE	Utilization of clean and renewable energies requires progress across a broad spectrum of technological fields. This progress demands novel and interdisciplinary conceptual approaches enabling the development of the functional properties of new materials that serve as the critical operational components of devices and systems to be used for the conversion between different forms of energy.
PREREQUISITES	INORGANIC SUBSTANCES WITH SPECIAL PROPERTIES
COURSE CONTENTS	1. Fundaments processes of converting energy: thermoconversion and thermionic conversion. Power Yields. Photovoltaic conversion. Method of storing energy 2. Inorganic materials: definition and classification of the inorganic materials used in processes for converting energy. Properties of the inorganic materials used in processes of energy conversion. Thermoelectric devices. 3. Solar cells based on monocrystalline silicon. Thin film solar cells; Applications and implementations. 4. Cell characteristics and the effect of temperature on conversion efficiency. Solar cells based on amorphous silicon. Cell characteristics and the diffusion of impurities through the electrode. 5. Solar cells based on semiconductor solar cells CdS/Cu_2S type. The technology for obtaining a layer of CdS and a layer of Cu_2S. 6. Fuel cells. Batteries. Construction and operation of fuel cells with solid fuel, liquid and solid-gas. Construction and operation of the acid and alkaline accumulators. 7. Construction of inorganic materials used in future processes of energy conversion.

RECOMMENDED READING	1. A.Chiuță, I.N.Chiuță, C.Stoica, E.Anghel *Universul energiei*, Ed. Electra, 2004 2. M.Paulescu, Z.Schlett, *Aspecte practice în conversia fotovoltaică a energiei solare*, Ed.Mirton, Timişoara, 2002. 3. S.Melinte, A.Jeflea, I.Rusu, *Conversia energiei*, Editura CERMI, Iaşi, 1998. 4. O.Tomuță *Acumulatoare electrice*, Ed.Tehnică, 1988. 5. V.Pop, I.Chicinaş, N.Jumate, *Fizica materialelor, Metode experimentale*, PRESA UNIVERSITARĂ CLUJEANĂ, Cluj-Napoca, 2001.
TEACHING METHODS	Theoretical lectures and debates about the obtaining and properties of the inorganic materials used as components in energetic systems and about the construction and the functionality of the electrical devices.

ASSESSMENT METHODS	Written and oral tests. Final grade calculation: 50% activity to seminars; 50% final written examination
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**CATALYSTS AND ADVANCED/CLEAN CATALYTIC PROCESSES**	CODE: CM5406

YEAR OF STUDY	II	SEMESTER	4	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. LECTURER DOINA LUTIC and PHD. LECTURER IULIEAN-VASILE ASAFTEI

OBJECTIVE OF THE COURSE	The highlighting of the advantages of the heterogeneous catalytic processes. The correlation of the reaction mechanisms with the diffusion and adsorption processes; shape selectivity. Polyfunctional and supported catalysts: preparation and characterization. Elements of assymetric and enzymatic catalyis. “Clean” catalytic reactions for hydrocarbons processing and fine synthesis.
PREREQUISITES	Inorganic Chemistry, Organic Chemistry, Physics, Materials Chemistry
COURSE CONTENTS	Elementary steps of the heterogeneous catalytic reactions. The role and importance of diffusion on the reaction kinetics and product distribution. Shape selective catalysis. The characterization of the solid-base catalysts by test reactions. Elements of enzymatic catalysis. Asymmetric enzymatic catalysis. Clean heterogeneous catalytic processes: aromatization of the low hydrocarbons, alkylation, isomerization. Obtaining of fuels from unconventional feedstock. Obtaining of lubricants by alternative methods. Obtaining of fine chemicals.

RECOMMENDED READING	1. E. Dumitriu, D. Lutic – Cataliza: o abordare generală, Editura Performantica, Iaşi, 2002. 2. F. Rouquerol, K. S. W. Sing, J. Rouquerol - Adsorption by Powders and Porous Solids: Principles, Methodology and Applications, Academic Press, 1999. 3. S. Carre, N.S. Gnep, R. Revel, P. Magnoux - Characterization of the acid–base properties of transition aluminas by model reaction, Applied Catalysis A: General, 348, 2008, p. 71. 4. L. Forni – Standard Reaction Tests for Microporous Catalysts Characterization, Catalysis Today, 41, 1998, p. 221. 5. I. Asaftei, N. Bilbă, Gh. Iofcea, Elemente de Cataliză, Editura Cermi, Iaşi, 2002. 6. Ch. Satterfield, Heterogeneous Catalysis in Practice, McGraw-Hill Book Comp.. New York, 1980. 7. I. V. Asaftei, Gh. Iofcea, Conversia hidrocarburilor inferioare pe catalizatori zeolitici, Coordonator ştiinţific, prof. dr. N. Bilbă, Ed. Performantica, 2007. 8. M. Guisnet, J. P. Gilson, Zeolites for Cleaner Technologies, Imperial College Press, 2002
TEACHING METHODS	Lectures using video projection, employing the heuristic method

EVALUATION METHODS	Average mark: 50% Continuous evaluation at seminaries 50% Final evaluation of the knowledge from course notions Final course average mark: 50% Evaluation in the 8th week 50% Evaluation in the 16th week Admission conditions: Minimal average mark for each evaluation form is 5 Criteria: Achievement of the minimal performance standards corresponding to the discipline Examination forms: written work evaluation based on the course information and optional oral examination
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**NONLINEAR DYNAMICS AND DYNAMICS OF CHEMICAL SYSTEMS**	CODE: CF 5317

YEAR OF STUDY	II	SEMESTER	3	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. PROFESSOR CONSTANTIN GHIRVU

OBJECTIVE OF THE COURSE	The assimilation of the backgrounds for the understanding of the detailed mechanism of a chemical reaction both as a nonlinear and linear process. The calculation of the reaction trajectory and the investigation of a chemical reaction as a scattering process by using quantum dynamical methods.
PREREQUISITES	Mathematics, Physics, Chemical Physics, Quantum Chemistry
COURSE CONTENTS	Backgrounds of Classical and Semi/classical Dynamics. General Principles of Quantum Dynamics. Quantum theory of Scattering process. Systems with nonlinear Characteristic.

RECOMMENDED READING	1. S.M. Blinder, Foundations of Quantum Dynamics, Acad. Press, N.Y.1972 2. A. Bîrzu, G.Bourceanu, Lavinia Onel, Dinamică neliniară, Edit. Matrix, Bucureşti 2003 3. C. Ghirvu, Mecanică cuantică, I.P. Iaşi, 1983 4. R.D. Levine and R.B. Bernstein, Molecular Reaction Dynamics and Chemical Reactivity, Oxford Univ. Press, 1987 5. T. Baer and W.L. Hase, Unimolecular Reaction Dynamics, Oxford Univ. Press, 1996
TEACHING METHODS	Lectures and Conversations .

ASSESSMENT METHODS	Written exam in the 8th and 16th week of the semester. Final results (at least a 5 grade) is assigned as following: 50% is assigned according to the written test results and 50% established based on the evaluation during the semester.
LANGUAGE OF INSTRUCTION	Romanian.

COURSE TITLE	**PHYSICAL CHEMISTRY OF POLYMERS**	CODE: CF5318

YEAR OF STUDY	II	SEMESTER	3	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER OF SCIENCE	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PH. D. ASSOCIATE PROFESSOR MIRCEA-ODIN APOSTU

OBJECTIVE OF THE COURSE	The polymeric materials play a very important role in the modern society. Natural and synthetic polymers are used in almost all fields of activity. It is very important to understand the way in which the polymeric materials affect the environment and to find the most efficient methods for waste polymers recycling. The lectures provide the fundamentals notions and methods necessary for the polymer studies. A special attention is dedicated to the correlation between chemical structure, properties and polymers applications. The existence of the molecular mass distribution of polymers creates the necessity to use specific characterization techniques and to extend the classical theoretical models in order to study and explain this special state of matter. There is a continuous need to explain correctly, starting from clear notions, the experimental results in order to establish correlations between the structure and the properties of various polymers.
PREREQUISITES	- MATHEMATICS, PHYSICS - CHEMICAL THERMODYNAMICS, CHEMICAL KINETICS, COLOIDAL CHEMISTRY - ORGANIC CHEMISTRY
COURSE CONTENTS	1. Macromolecular state: definitions, structural characteristics. 2. Types of average molecular masses of polymers. Polydispersity of macromolecular substances. Methods for polymer fractionation. Molecular mass distribution curves. 3. Thermodynamics of polymer solutions. Dissolution heat. Dissolution entropy. Polymer-solvent mixing Gibbs energy. Flory-Huggins theory of macromolecular solutions. 4. Coligative properties of polymer solutions. Molecular mass determination by tonometry, cryoscopy, ebullioscopy and final group titration. 5. Osmotic pressure of polymer solutions. Determination of numeric average molecular mass and of the second virial coefficient, A2. The relation between A2 and the Flory-Huggins interaction coefficient. Theta conditions for polymer solutions. 6. Structural-thermodynamic parameters specific to polymers. Definitions and methods for determination. Average dimensions. Gyration radius. Volume effects. Flexibility of macromolecular chains. 7. Polymer solutions viscosity. Viscosity dependence on concentration. Structural-thermodynamic information obtained from viscosity measurements. The relation between intrinsic viscosity and the molecular mass. 8. Light scattering from polymer solutions. Determination of gravimetric average molecular weight, of the second virial coefficient and of the gyration radius. 9. Aggregation states and phase states of polymers. Glass transition in polymers. Definitions and experimental methods. Practical importance. 10. Polymers degradation. Environmental impact.

RECOMMENDED READING	1. Ana Onu, *Chimia fizica a starii macromoleculare*, Ed.Tehnopress, Iasi, 2002. 2. M. Leca, *Chimia fizica a macromoleculelor*, Ed.Univ.Bucuresti,1998. 8. D.J. Sandman, *Crystallographically ordered polymers*, American Chemical Society, Washington, 1987. 7. P. W. Atkins, C. A. Trapp "Exerciţii şi probleme de chimie fizică", Ed. Tehnică, Bucureşti, 1997. 9. M. Daranga, C. Mihailescu, M. Popa, M. Nicu, N. Bejan, *Fizica polimerilor*, Ed. Ex Libris, Braila, 2000. 11. H. Fujita, *Polymer Solutions*, Elsevier, 1997.
TEACHING METHODS	PRESENTATION, DEMONSTRATION, DISCUSSION

ASSESSMENT METHODS	WRITTEN EXAMINATION FROM THE CONTENT OF THE LECTURES AND SEMINARS WHICH COUNTS FOR 60% OF THE FINAL GRADE. THE ACTIVITY DURING THE LABORATORY IS EVALUATED CONTINUOUSLY AND COUNTS FOR THE 40% OF THE FINAL GRADE.
LANGUAGE OF INSTRUCTION	ROMANIAN

COURSE TITLE	**ENVIRONMENTAL MONITORING AND ANALYTICAL CONTROL IN ENVIRONMENTAL REMEDIATION**	CODE: CA5312

YEAR OF STUDY	II	SEMESTER	3	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. LECTURER SIMONA CUCU-MAN

OBJECTIVE OF THE COURSE	1.The student should be familiar with the theoretical and practical aspects of environmental monitoring, in order to learn how to apply them correctly in practice, as concern the proper choice of the adequate monitoring system, (bio)monitors for monitoring a selected environmental compartment to finally assess the contamination with organic and inorganic environmental pollutants, the correct processing and data interpretation. 2.The profound study of remediation (physical, chemical and biological) methods of the polluted environment and the most applied analytical methods controlling their efficiency.
PREREQUISITES	Analytical chemistry, Instrumental analysis, Inorganic chemistry, Organic chemistry, Environmental chemistry.
COURSE CONTENTS	1.General aspects of environmental pollution monitoring. Monitoring and monitoring plans: site characterization, data acquisition, field and laboratory investigations. 2.General steps of the analytical process in environmental monitoring. 3.Automated data acquisition and processing in environmental monitoring. 4.Air, water and soil quality monitoring. 5.Biomonitoring. Definition of terms: bioindication, bioaccumulation, bioconcentration, biomagnification, bioavailability, biotransformation. 6.Atmospheric heavy metal and organic pollutants deposition assessment by use of plants as biomonitors. 7.Monitoring of biological effects (biomarkers). 8.Physical and chemical remediation techniques. 9.Principles of bioremediation (the role of microorganisms in bioremediation, environmental pollutants for bioremediation, classification of bioremediation techniques). 10.Phytoremediation techniques (phytoextraction, phytostimulation, phytostabilization, phytovolatilization, phytotransformation, rhyzofiltration). 11.The bioremediation and phytoremediation of polluted soils and water. 12.Natural attenuation.

RECOMMENDED READING	1.Bargagli, R., *Trace Elements in Terrestrial Plants. An Ecophysiological Approach to Biomonitoring and Biorecovery*, Springer, Berlin, 1998. 2.Markert, B., ed., *Plants as Biomonitors. Indicators for Heavy Metals in the Terrestrial Environment*, Weinheim: VCH, 1993. 3.Markert, B., ed., *Environmental Sampling for Trace Analysis*, Weinheim: VCH, 1994. 4.Martin, A., *Biodegradation and Bioremediation*, Academic Press, 1999. 5.Shaw, J., ed., *Heavy Metal Tolerance in Plants: Evolutionary Aspects*, Boca Raton: CRC Press, 1990. 6.Singh, A., Ward, O.P., *Applied Bioremediation and Phytoremediation*, Springer Verlag, 2004. 7.Tsao, D., ed., *Phytoremediation*, 2003. 8.Wilkinson, R.E., *Plant-environment interactions*, Marcel Dekker, New York, 2000. 9.Wiersma, G.B., ed., *Environmental monitoring*, Boca Raton, CRC Press, 2004.
TEACHING METHODS	Lecture, conversation, exemplification, algorithmization, demonstration, programmating investigation, brainstorming, comparison. PowerPoint presentation. Experimental laboratory work.

ASSESSMENT METHODS	Written examination and assessment of the experimental laboratory work. Exam mark = 0.5 × exam mark for the experimental laboratory work + 0.5 × exam mark for the written examination.
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**DYNAMICS OF INTERMOLECULAR INTERACTIONS**	CODE: CF5320

YEAR OF STUDY	II	SEMESTER	3	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PH.D. ASSOCIATE PROFESSOR IONEL HUMELNICU

OBJECTIVE OF THE COURSE	Deepening the knowledge acquired earlier in the field of intermolecular interactions considering the molecular, thermodynamics and quantum nature of their. The knowledge of the models, theories and concepts for study of these interactions in the gaseous or condensed states.
PREREQUISITES	Mathematics (differential equations), Chemical thermodynamics, Chemical kinetics, Quantum Chemistry, Molecular Structure
COURSE CONTENTS	- Intermolecular interactions and their classifications. - Induction, dispersion and repulsion forces. - Empirical potential of intermolecular interactions. - Interactions in gaseous and condensed phase. - Electrostatic interaction type: ion-dipole, dipole-dipole, charge-molecule, ion-induced dipole, induced dipole-induced dipole. - Polarizable intermolecular interactions type. - Thermodynamic aspects of molecular interactions - Specific interactions - hydrogen bonds - Molecular beam interactions. - Quantum approach to molecular interactions in solution.

RECOMMENDED READING	- J. Israelachvili, "Intermolecular and Surface Forces", Academic Press Limited, London, 1992; - Alain Gerschel, “Liaisons intermoleculaires – Les forces en jeu dans la matiere condensee”, Savoirs Actuels, InterEditions, CNRS Editions, 1995; - D. Hirst, “A Computational Approach to Chemistry”, Blackwell Scientific Publications, Oxford London, 1990; - J.M. Haile, “Molecular Dynamics Simulation-Elementary Methods”, John Wiley, Academic Press, New York, 1992; - I. Kaplan**, “**Intermolecular Interactions: Physical Picture, Computational Methods and Model Potentials”, John Wiley, Academic Press, New York, 2006 - A. J. Stone, “The Theory of Intermolecular Forces”, Oxford University Press, New York, 1997
TEACHING METHODS	PRESENTATION

ASSESSMENT METHODS	1. From the content of the lecture, there are two partial exams, in eighth and sixteen week of the semester, with 50% contribution of the final grade. 2. For the practical laboratory, there is an exam during the semester, counting for 50% of the final evaluation.
LANGUAGE OF INSTRUCTION	ROMANIAN

COURSE TITLE	**CHEMOMETRICS AND ANALYTICAL SIGNAL PROCESSING**	CODE: CA5311

YEAR OF STUDY	II	SEMESTER	3	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	OC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	LECTURER PHD. CECILIA ARSENE ASSOCIATED PROFESSOR PHD. ROMEO-IULIAN OLARIU

OBJECTIVE OF THE COURSE	To develop suitable skills regarding correct assumption of probabilistic distribution functions in the statistical fundamentals. To develop operational capacity of the chi-square, Student and t tests in the databases investigation. To assess and interpret analytical data from multi- dimensional systems. To recognise real situations that requires corrective analytical signal processing. To develop suitable skills of multivariate data processing with proper attribution to any source.
PREREQUISITES	Environmental chemistry, Sampling and investigation methodologies, Instrumental practices in investigating chemical systems.
COURSE CONTENTS	Basic concepts in chemometry (discrete and random variables, population and probabilistic density and probabilistic density functions), the fundamental tool in analytic data processing. Multivariable results investigation from field measurements. Processing of multidimensional data from chemical analysis. Factorial analysis, clusters analysis, principal component analysis. Investigation of associations and trends resulting from long-term monitoring of the environment. Geo-statistic. Krigging processing. Strategies for transfer of multivariate calibration. Signal processing and correlation techniques. Resolution signals. Methods to improve the analytical signal.

RECOMMENDED READING	16. Chemometrics in environmental chemistry. Statistical Methods, Einax, J., ed., Springer, 1995. 17. Encyclopaedia of analytical chemistry, Meyers, R.A., ed., John Wiley&Sons, 2000. 18. EURACHEM/CITAC Guide, Quantifying uncertainty in analytical measurements, Second edition, eds. Ellison, S.L.R., Rosslein, M., and Williams, A., 2000. 19. Statistics in Ecotoxicology, Sparks, T., ed., John Wiley&Sons, 2000. 20. Environmental monitoring and characterization, Janick, F., Artiola, J.F., Pepper, I.L., Brusseau, M.L., Brown, P., Musil, S.A., eds., Elsevier, 2004. 21. Practical guide to chemometrics, Gemperline, P.J., ed., Chapters 1, 2, 4, Taylor&Francis, 2006.
TEACHING METHODS	Lecture, interactive discussion, demonstration, algorithms in solving exercises and problems.

ASSESSMENT METHODS	Discipline note	50% continue to laboratory and / or seminar 50% score course evaluation
	Course evaluation score	50% score evaluation in week 8^{th} 50% score evaluation in week 16^{th}
	Terms	Making full laboratory work and promote the final test given at the laboratory. Minimum score for each form of assessment is 5.
	Criteria	Achieving minimum performance standards related with discipline.
	Type	Written exam.
LANGUAGE OF INSTRUCTION	Romanian	

COURSE TITLE	**SPECIATION ANALYSIS APPLIED TO ENVIRONMENTAL STUDIES**	CODE: CA5413

YEAR OF STUDY	II	SEMESTER	4	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD LECTURER SIMONA-MARIA CUCU-MAN

OBJECTIVE OF THE COURSE	The priority domain of the course is the speciation analysis and implicitly the tandem techniques applied in speciation analysis. Speciation analysis represents one of the main actual directions in Environmental Analytical Chemistry. The course is focused on the main categories of species and their influence on environmental pollution. In addition, it will emphasize important aspects on the sample preparation for analysis and the main modern chromatographic separation techniques and atomic spectrometry (mainly inductively coupled plasma mass spectrometry) that represents a tandem technique.
PREREQUISITES	Analytical chemistry, Instrumental analysis, Inorganic chemistry, Organic chemistry
COURSE CONTENTS	1.General aspects of speciation analysis. Definition of terms: species, speciation, speciation analysis, fractionation. 2.Elemental speciation of selected elements in the environment (aluminum, arsenic, cadmium, chromium, cobalt, copper, iron, manganese, mercury, molybdenum, nickel, lead, sulphur, selenium, tin, thallium, vanadium, zinc). 3.Sampling: collection, processing and storage of environmental samples. 4.Sample preparation (solubilization of solid samples, derivatization techniques, preconcentration and clean-up). 5.Separation techniques (liquid chromatography, gas chromatography, micellar electrokinetic chromatography, supercritical fluid chromatography, capillary electrophoresis). 6.Speciation analysis by spectroscopic methods. 7.Speciation analysis by electrochemical and radiochemical methods.

RECOMMENDED READING	1.J. Minczewski, J. Chwasowska, R. Dybczynski, Separation and preconcentration methods in inorganic trace analysis, Ellis Horwood Ltd., Poland, 1982. 2.R. Cornelis, J. Caruso, H. Crews, K. Heumann (Eds.), *Handbook of Elemental Speciation II. Species in the Environment, Food, Medicine and Occupational Health*, John Wiley & Sons, UK, 2005. 3.P. J. Craig (Ed.), *Organometallic compounds in the environment. Principles and reactions*, Longman Group Limited, UK, 1986. 4.B. V. Ioffe and A. G. Vitenberg, *Head-Space Analysis and Related Methods in Gas Chromatography*, John Willey&Sons, USA, 1982. 5.H. E. Taylor, *Inductively Coupled Plasma-Mass Spectrometry. Practices and techniques*, Academic Press, California, USA, 2001. 6.A. Montaser (Ed.), *Inductively Coupled Plasma Mass Spectrometry*, Wiley-VCH, Washington DC, 1998. 7.S. J. Hill (Ed.), *Inductively Coupled Plasma Spectrometry and its Applications*, Sheffield Academic Press, Sheffield, UK, 1999. 8.I. Ali, H. Aboul-Enein, *Instrumental Methods in Metal Ion Speciation*, Taylor & Francis Group, Boca Raton, FL, 2006.
TEACHING METHODS	Lecture, conversation, exemplification, algorithmization, demonstration, programmating investigation, brainstorming, comparison. PowerPoint presentation. Experimental laboratory work.

ASSESSMENT METHODS	Written examination and assessment of the experimental laboratory work. Exam mark = 0.5 × exam mark for the experimental laboratory work + 0.5 × exam mark for the written examination.
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**ATMOSPHERIC PROCESSES IN GASEOUS PHASE**	CODE: CA5419

YEAR OF STUDY	II	SEMESTER	4	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	ASSOCIATED PROFESSOR PHD. OLARIU ROMEO-IULIAN

OBJECTIVE OF THE COURSE	The course is addressed to graduates who have a good scientific background and can get detailed information on the possibilities of investigation of chemical systems in the environment. The purpose of this course is to give students factual information on issues of environmental chemistry, particularly those related to the effect of physico-chemical processes in the atmosphere. The course aims simultaneously factors contributing to these phenomena but also their influence on current observations and future possible developments in the environment. The subject discussed is an interdisciplinary nature, designed for example the results of interaction between the chemical composition of the atmosphere and the physical, biological and climate.
PREREQUISITES	Environmental chemistry, Sampling and investigation methodologies, Instrumental practices in investigating chemical systems.
COURSE CONTENTS	Fundamental principles of spectroscopy and photochemistry deep to atmospheric conditions. Photochemistry of important atmospheric species. Chemical species containing oxygen, nitrogen, sulphur, halogens. Sources of oxidants in the troposphere (the hydroxyl radical (OH), ozone (O_3), nitrate radical (NO_3), hydroperoxyl radical (HO_2) and chlorine atoms (Cl)). Atmospheric chemistry of inorganic compounds containing nitrogen in their molecules. Oxidation of nitrogen dioxide (NO_2). Atmospheric chemistry of nitrous acid (HNO_2) and nitric acid (HNO_3). Reactions in the atmosphere of saturated, unsaturated or aromatic hydrocarbons with different oxidizing agents. The importance of oxidation processes in matrix organic-NOx-air. Processes of formation and consumption of organic and inorganic acids in the troposphere. Formation of acid deposits. Oxidation reactions in the atmosphere of organic compounds containing sulphur in their molecules. Atmospheric aerosols formation.

RECOMMENDED READING	22. Air borne particulate matter, ed. T. Kouimtzis and C. Samare, Springer, Berlin, 1995. 23. Environmental chemistry. A global perspective, G.W. Van Loon and S.J. Duffy, Oxford University Press Inc., 2000. 24. Chemistry of the upper and lower atmosphere. Theory, experiments and applications, B.J. Finlayson-Pitts and J.N. Pitts, Academic Press, UK. 2000. 25. Intergovernmental Panel on Climate Change, Climate change 2007: The physical science basis, Contribution of working group 1 to the fourth assessment report of the Intergovernmental Panel on Climate Change, 2007. 26. Pollution – cause, effects and control, ed. R.M. Harrison, the Royal Society of Chemistry, Cambridge, 1995. 27. Atmospheric chemistry and physics. From air pollution to climate change, J.H. Seinfeld and S.N. Pandis, John Wiley& Sons, 1998.
TEACHING METHODS	Lecture, demonstration, solving exercises.

ASSESSMENT METHODS	Discipline note	50% continue to laboratory and / or seminar 50% score course evaluation
	Course evaluation score	50% score evaluation in week 8^{th} 50% score evaluation in week 16^{th}
	Terms	Making full laboratory work and promote the final test given at the laboratory. Minimum score for each form of assessment is 5.
	Criteria	Achieving minimum performance standards related with discipline.
	Type	Written exam
LANGUAGE OF INSTRUCTION	Romanian	

COURSE TITLE	**SPECIAL TOPICS IN PHYSICAL CHEMISTRY**	CODE: CF 5421

YEAR OF STUDY	II	SEMESTER	4	TYPE OF COURSE (CC-compulsory/OC-optional/EC-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PH. D. ASSOCIATE PROFESSOR ADRIAN BÎRZU

OBJECTIVE OF THE COURSE	To present some special chapters of chemical kinetics and molecular thermodynamics. The practical activities and seminars present experimental and theoretical applications of the chapters presented in the lectures.
PREREQUISITES	Chemical kinetics. Chemical thermodynamics. Mathematics.
COURSE CONTENTS	1. Thermodynamic principles and applications. 2. Thermodynamics of biochemical reactions. 3. Equilibrium statistical mechanics. Kinetic gas theory. 4. Transport phenomena. 5. Theories of the reaction rates. 6. Kinetics of solution reactions. 7. Special topics in catalytic kinetics.

RECOMMENDED READING	1. D. A. McQuarrie, *Physical chemistry – a molecular approach*, University Science books, Sausalito, 1997. 2. A. Bîrzu, M. Dumitraş, *Cinetică chimică. Aspecte fundamentale*, MatrixROM, Bucureşti, 2008. 3. R. I. Masel, *Chemical Kinetics and Catalysis*, Wiley, 2001. 4. J. Steinfeld, J. Francisco, W. Hase, *Chemical Kinetics and Dynamics*, Prentice Hall, 1989. 5. K. J. Laidler, *Chemical Kinetics*, Harper&Row, 1987. 6. P. Atkins, J. de Paula, Physical chemistry for the life sciences, Oxford University Press, 2005 7. R. J. Silbey, R. A. Alberty, Physical chemistry, Wiley, 2005. 8. R. G. Mortimer, Physical chemistry, Academic Press, San Diego, 2000.
TEACHING METHODS	Lecture

ASSESSMENT METHODS	2x25% of the final grade for two written tests from the seminar applications (weeks 7 and 15 of the semester), and 2x25% for two written exams from the content of the lectures (weeks 8 and 16).
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**ANALYTICAL CHEMISTRY OF PERSISTENT POLLUTANTS**	CODE: CA5414

YEAR OF STUDY	II	SEMESTER	4	TYPE OF COURSE (CC-compulsory/OC-optional/EC-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PH D ASSISTANT ALIN CONSTANTIN DÎRȚU

OBJECTIVE OF THE COURSE	This course aims at systematical investigation of the analysis of complex matrices (different environmental matrices, biological samples, food items, etc) in order of quantifying selected contaminants. It also aims at familiarizing of students regarding each step of the analysis methodology, namely: different sampling techniques, sample preparation, selected analysis techniques, interpretation of the results. The students will receive information in order to be able to correlate the chemical nature of a certain contaminant class with the existing possibilities for analysis methodologies.
PREREQUISITES	General chemistry. Analytical Chemistry.
COURSE CONTENTS	Toxicology: definition, aims, relations with other disciplines. Sampling and specific sample preparation. Correlations between physico-chemical proprieties – separation methodologies/analysis. Analysis schemes. Separation and identification of selected toxic compounds using different methodologies, namely: GC, CSS, CSI, HPLC, electrophoresis, etc. Spectrometric methodologies (AAS, ICP-MS, IR and UV-VIS) applied on analysis of selected toxic compounds. Electrochemical analysis methodologies applied on determination of selected contaminants. Analysis of inorganic contaminants from various matrices. Analysis of pesticides and rodenticides. Analysis of selected medicaments. Analysis of selected food additives.

RECOMMENDED READING	1. Stahr H.M., Analytical methods in toxicology, J. Willey& Sons, 1991 2. Flanagan R.J., Basic analytical toxicology, WHO, 1995 3. Hodgson E., A textboock of modern toxicology, J. Willey& Sons, 2004 4. Cotrău M., Butuc A., Toxicologie minerală, Ed. Ministerul Industriei Chimice, 1981 5. Roman L., Teste analitice rapide, Ed Tehnică,1994
TEACHING METHODS	Lecture

ASSESSMENT METHODS	2x20% of the final grade for two written tests from the practical applications (weeks 7 and 15 of the semester), and 2x30% for two written exams from the content of the lectures (weeks 8 and 16).
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**KINETICS OF CHAIN REACTIONS**	CODE: CF5416

YEAR OF STUDY	II	SEMESTER	4	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	OC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	6

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. LECTURER MIHAI DUMITRAŞ

OBJECTIVE OF THE COURSE	The students will acquire specific knowledge referring to the kinetics and mechanism of chain reactions, and will be able to handle methods of kinetic analysis of complex reacting systems, adapted to chain reaction mechanisms (such as the computational singular perturbation method). Important classes of chain reactions, relevant in environmental chemistry, will be analyzed from a kinetic point of view, such as atmospheric reactions of halogens and ozone, hydrocarbon pyrolysis and oxidation, polymer formation and degradation. Students will also receive training in order to be able to work out, from both a theoretical and from an experimental point of view, kinetic studies on complex reacting systems involving chain reaction mechanisms.
PREREQUISITES	Mathematics, Chemical thermodynamics, Chemical kinetics
COURSE CONTENTS	13. Elements of kinetic modeling of complex reacting systems. Approximation methods. Methods of reduction of the reaction mechanism. Kinetic lumping. 14. Kinetic particularities of chain reactions. 15. Steps of a chain reaction. Major classes of elementary reactions involved in chain reaction mechanisms. Thermokinetics of elementary reactions. 16. Kinetic theory of chain reactions. 17. The Computational Singular Perturbation method of kinetic analysis. CSP analysis of chain reactions mechanisms. 18. Kinetics and mechanism of the major classes of chain reactions in environmental chemistry: atmospheric reactions of halogens and ozone, hydrocarbon pyrolysis and oxidation, polymer formation and degradation, the HO_x, NO_x and ClO_x cycles, coupling of catalytic cycles.

RECOMMENDED READING	1. L. Odochian, M. Dumitraş, Teoria cinetică şi mecanismul reacţiilor în lanţ. I. Reacţii în lanţ simplu, Editura. Matrix ROM, Bucureşti, 2003 2. Sochet, L.R., La cinetique des reactions en chaines, Dunod, Paris, 1971; 3. Steinfeld, I.J., Francisco, J., Hase, W.L., Chemical Kinetics and Dynamics, 2nd Edition, Prentice Hall, Upper Saddle River, New Jersey, 1999; 4. Pilling, M.J., Seakins, P.W., Reaction Kinetics, Oxford University Press, Oxford, New York, Tokyo, 1996; 5. I.A. Schneider, Cinetică chimică, Ed. Didactică şi Pedagogică, Bucureşti, 1974 6. S. W. Benson, Thermochemical Kinetics, Ed. John Willy, New York, 1976 7. Benson, S.W., în: Pryor, W.A. (ed.), Frontiers of Free Radical Chemistry, Academic Press, New York, 1980;
TEACHING METHODS	Exposition, demonstration, conversation, experimental work, problem solving.

ASSESSMENT METHODS	Tests during the semester, written exam at the end of the semester.
LANGUAGE OF INSTRUCTION	ROMANIAN

COURSE TITLE	**PORTFOLIO FOR DIDACTIC EXAMS**	CODE: CO5333

YEAR OF STUDY	II	SEMESTER	3	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	8

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. PROFESSOR VALERIU ŞUNEL

OBJECTIVE OF THE COURSE	The structure of the course has a thematic that aproaches the notions of organic chemistry and methodic that could sustain the candidat's compatibility involved into didactic contests. On could affinrm that through the participation at the course it is desired that the cabdidate could accumulate new aknolegements at a superiour level . this knowlwdgements are needed in order to participate to didactic contests.
PREREQUISITES	The chemistry of natural compounds, Heterocycles Chemistry
COURSE CONTENTS	It is based on a new analitical program which includes dates that can compleet the accumulate aknoledgements, making easier the preparatives in the organic chemistry field and in teaching the courses. The course theme alowes a better arrangement of the data according to its importance as contest subjects.

RECOMMENDED READING	1. Avram, M., Chimie Organica vol.I,II, Ed.Academiei, Bucuresti, 1983. 2. Nenitescu,C.D., Chimie Organica vol.I,II, Ed. Didactica si Pedagogica, Bucuresti, 1980. 3. Şunel,V., Chimie Organica, Ed.Universitatea "Al. I.Cuza" Iasi, 1995. 4. Şunel,V., Probleme de Chimie Organica, Ed. Marathon, Iasi, 1997. 5. Şunel,V., Ciocoiu,I., Rudica,T., Bicu,E.,Metodica Predarii Chimiei, Ed, Marathon, Iasi, 1997. 6. Cozma,J., Şunel,V., Chimie Organica, Ed. Tehnopress, Iasi, 2005 7. Cheptea,C., Cozma,J.,Moise,M., Şunel,V., Probleme si Exercitii de Chimie Organica, Ed. Tehnopress, Iasi, 2009 8.Neculau,A., Psihopedagogie, Ed. Spiru Haret, Iasi, 1994
TEACHING METHODS	Lecture

ASSESSMENT METHODS	Written exam
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**TEHNICAL INORGANIC COMPOUNDS**	CODE: CN5333

YEAR OF STUDY	II	SEMESTER	3	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	8

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD ASSOCIATE PROFESSOR DUMITRU GÂNJU

OBJECTIVE OF THE COURSE	Students will be able to correlate physical properties of some inorganic compounds with stereochemical environment in crystals and crystals defects.
PREREQUISITES	Inorganic chemistry (general), chemistry of metals, coordination chemistry
COURSE CONTENTS	1.Inorganic Compounds With Special Electric Properties 2.Inorganic Compounds With Magnetic Properties 3.Inorganic Compounds With Optical Properties

RECOMMENDED READING	1. I.Teoreanu ș.a., “Introducere în ştiința materialelor anorganice” Ed.Tehnică,Bucureşti,1987 2.D.Gânju,”Substanțe tehnice anorganice”, Ed.Univ.”Al.I.Cuza” Iaşi1997 3. I.I.Nicolaescu,V.G.Canțer,”Fizica corpului solid”, Chişinău,1991 4. Handbook of preparative Inorganic Chemistry, Edited by G.Bauer,A.Press, London 1963
TEACHING METHODS	Lecturer, interactive teaching methods , case study

ASSESSMENT METHODS	Written examination
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**STRATEGIES IN ORGANIC SYNTHESIS**	CODE: CO5431

YEAR OF STUDY	II	SEMESTER	4	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER OF SCIENCE	8

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. ASSOCIATE PROFESSOR MIHAIL- LUCIAN BÎRSĂ

OBJECTIVE OF THE COURSE	The graduate students will be able to understand the general and special principles of main reagents used in major organic reactions.
PREREQUISITES	B.Sc. degree and Advanced Organic Chemistry course
COURSE CONTENTS	Molecular complexity. Multisteps chemical synthesis. Types of tactics and strategies for synthesis. Thinking about synthesis. Retrosynthetic analysis. Transforms, synthons, retrons. Diels-Alder cycloaddition – a model for the study of tactics and strategy in organic chemistry.

RECOMMENDED READING	1. T. Lindberg, *Strategies and Tactics in Organic Synthesis*, Academic Press, Inc. Harcourt Brace and Company, San Diego, New York, Boston, London, Sydney, Toronto, vol. I, 1984. 2. T. Lindberg, *Strategies and Tactics in Organic Synthesis*, Academic Press, Inc. Harcourt Brace Jovanovich, San Diego, New York, Berkeley, Boston, London, Sydney, Tokyo, Toronto, vol. II, 1989. 3. T. A. Hase, *Umpoled Synthons. A Survey of Sources and Uses in Synthesis*, Wiley-Interscience Publication, John Wiley and Sons, New York, 1987. 4. E. J. Corey, *The Logic of Chemical Synthesis*, John Wiley and Sons, New York, Chishester, Brisbane, Toronto, Singapore, 1989.
TEACHING METHODS	presentation

ASSESSMENT METHODS	Written
LANGUAGE OF INSTRUCTION	Romanian or english, on demand

COURSE TITLE	**ADVANCED BIOINORGANIC CHEMISTRY**	CODE: CN5432

YEAR OF STUDY	II	SEMESTER	4	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	8

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. PROFESSOR ALEXANDRA RALUCA IORDAN

OBJECTIVE OF THE COURSE	This course has the purpose to provide the students with those knowledges that will allow them to read critically papers concerning bioinorganic issues and to join with little difficulties research groups dealing with bioinorganic chemistry.
PREREQUISITES	Students must possess a basic knowledge of biochemistry and of coordination chemistry
COURSE CONTENTS	The frontiers of bioinorganic chemistry. Roles of metalloproteins in cells: choice, uptake and assembly of metal containing units in biology. Tuning of metal properties by proteins to obtain specific functions Metal protein analysis according to the metal: Iron, Copper, Molybdenum, Cobalt, Zinc and other metals. Elements of design, synthesis and study of syntetic metalloreceptors or the selective recognition of biological substrates.

RECOMMENDED READING	1) Bertini I., Gary H. B., Stiefel E. I., Valentine J. S., Biological Inorganic Chemistry, University Science Books, 2006 2) Palamaru M. N., Iordan Al. R., Popa K., BazeleChimie bioanorganice. Lucrări practice si aplicații, Editura Tehnopress, Iaşi, 2004. 3) Palamaru M. N., Iordan Al. R., Cecal Al., Chimie bioanorganică generală, Editura Universității "Al. I. Cuza, Iaşi, 1998. 4) Palamaru, M.N., Iordan, Al.R., Cecal, Al., Chimie bioanorganică şi metalele vieții, Editura BIT, Iaşi, 1997. 5) Lippard S.J., Berg J.M. - Principes de biochimie minérale, De Boeck Université, 1997 6) Blondin G., Girerd J.J., Meunier B. - Chimie bioinorganique, Ecole Polytechnique Palaiseau, France, 1996.
TEACHING METHODS	Lectures, Collective problem solving

ASSESSMENT METHODS	Written examination (50%) and quizzes to assess practical skills (50%)
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**PORTFOLIO FOR DIDACTIC EXAMS -PRACTICUM**	CODE: CO5434

YEAR OF STUDY	II	SEMESTER	4	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	CC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
MASTER	7

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD. PROFESSOR VALERIU ŞUNEL

OBJECTIVE OF THE COURSE	The structure of the course has a thematic that aproaches the notions of organic chemistry theoretical and practical that could sustain the candidat's compatibility involved into didactic contests. On could affinrm that through the participation at the course it is desired that the cabdidate could acumulate aknoledgements that cand compleet those acuumulate in the first semester and are useful for didactic exams titularisation and first and second degree. . This knowlwdgements are needed in order to participate to didactic contests.
PREREQUISITES	The chemistry of natural compounds, Heterocycles Chemistry
COURSE CONTENTS	The course has useful data for the preparation in order to participate at didactic contests. The teached data have the effect the formation of profesional competences inorder to allow the teacher to participate at the contests

RECOMMENDED READING	8. Avram, M., Chimie Organica vol.I,II, Ed.Academiei, Bucuresti, 1983. 9. Nenitescu,C.D., Chimie Organica vol.I,II, Ed. Didactica si Pedagogica, Bucuresti, 1980. 10. Şunel,V., Chimie Organica, Ed.Universitatea "Al. I.Cuza" Iasi, 1995. 11. Şunel,V., Probleme de Chimie Organica, Ed. Marathon, Iasi, 1997. 12. Şunel,V., Ciocoiu,I., Rudica,T., Bicu,E.,Metodica Predarii Chimiei, Ed, Marathon, Iasi, 1997. 13. Cozma,J., Şunel,V., Chimie Organica, Ed. Tehnopress, Iasi, 2005 14. Cheptea,C., Cozma,J.,Moise,M., Şunel,V., Probleme si Exercitii de Chimie Organica, Ed. Tehnopress, Iasi, 2009 15. Şunel,V., Chimia Heterociclurilor-Practicum, , Ed. Tehnopress, Iasi, 2005 9. Bontas, I., Pedagogie, Ed.All, Bucuresti, 1994.
TEACHING METHODS	Lecture

ASSESSMENT METHODS	Written exam
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**EDUCATIONAL PSCHOLOGY**	CODE: RR1101

YEAR OF STUDY	I	SEMESTER	I	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	EC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR OF SCIENCE	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PH.D. PROFESSOR ANA CONSTANTIN

OBJECTIVES OF THE COURSE	After completing the study of this discipline, students will be able: (1) to describe the fundamental psychological processes of learning; (2) describe strategies for prevention and reducing of the disadaptive school behavior; (3) apply theoretical knowledge in real teaching settings; (4) investigate the individual personalities of school children; (5) manage the class as a group.
PREREQUISITES	-
COURSE CONTENTS	**I. The content of the educational /school psychology**. **II. Learning and learning theories**: definitions; learning theories; associationism, the theory of the psychogenesis of the intellectual operations, genetical-cognitive theory; types of learning; peculiarity of human learning. **III. Fundamental psychological processes involved in learning**: attention, perception, memory, thinking, language. **IV**. **Educational communication**: types of the communication; classroom communication and its peculiarity. **V**. **Creativity and its enhancement in school:** creativity factors; fundamental processes of the imagination; steps of the creative process; developing creativity. **VI**. **School motivation**: description of the motivation; the specific features of the school motivation; the level of aspiration. **VII**. **Affectivity** and its types: the evolution af the affectivity and forming high feelings in school setings. **VIII. Knowing pupils**: their personality, temperament, character, aptitudes (intelligence as a general aptitude). Methods of investigation. **IX**. **Psychogenetic outlines and description of the school stages of age**. The factors of the ontogenethical development (eredity, environment, education). Stages (cognitive, moral, psychosocial). Psychological description of the school age. **X. Psychological and social approach of the education:** the psycho-social dimension of the teacher's activity. Class control; school failure; youth delincvency.

RECOMMENDED READING	1. Ausubel, D. & Robinson, F., *School learning. An Introduction to Educational Psychology* (Translated into Romanian: *Învățarea în şcoală - O introducere în psihologia pedagogică*, E.D.P., Bucureşti, 1981). 2. Cosmovici, A., Iacob L. (coord.), *Psihologie şcolară (School Pscyhology)* , Polirom, Iaşi, 1998 (Available in Romanian). 3. Davitz , J., Ball, S., *Psychology of the Educational Process* (Translated into Romanian: *Psihologia procesului educațional,* E.D.P., Bucureşti, 1978). 4. Sălăvăstru, Dorina, *Psihologia educației (School Psychology),* Polirom, Iaşi, 2004. (Available in Romanian).
TEACHING METHODS	Lecture, debates, case study, learning in diads /groups.

ASSESSMENT METHODS	1. Continuous evaluation by the means of: works, reading, mid-term exams. 2. Final examination by written exam. 2. Seminar criteria: proving verbal and written communication abilities; proving competencies in searching, processing and using of the data; proving group cooperation and learning abilities. Criteria for final examination: a minimum necessary level of knowledge in educational psychology; accuracy of the presentation of the information; analysis and synthesis abilities.
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**FOUNDATIONS OF PEDAGOGY. CURRICULUM THEORY AND METHODOLOGY**			CODE: RR1202
YEAR OF STUDY	I	SEMESTER	2	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	EC
LEVEL OF COURSE		NUMBER OF **ECTS** CREDITS ALLOCATED	
BACHELOR OF SCIENCE		5	
NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME		
	PHD. PROFESSOR CARMEN MIHAELA CREȚU PHD. ASIST. BOGDAN CONSTANTIN NECULAU		
OBJECTIVE OF THE COURSE	➢ To form a relevant image about the contemporary educational problems ➢ The initiation within the framework of the general pedagogy terminology ➢ The student implementation with theoretical and applicative skills in the area of the education theory and of the curriculum theory and methodology ➢ To offer a comparative vision on the curricular development from the euro-atlantic area		
PREREQUISITES	Psychology of education		
COURSE CONTENTS	- Systems of initial and ceaseless formation of the teachers and education managers. - Basic concepts. Pedagogy. Education. Functions of education. The education sciences system. - The educational action. Types of education. The traditional scales of education. The new educations. - Continuous education. Concept, characteristics, objects, contents, means of fulfilment. The impact of school education. The problems of contemporary education. - The educational system – concept, functions, the trends of evolution in Europe. - Theories/curriculum models. Relevance of some contemporary models. Types of curriculum. - Educational finalities (conceptual delimitations, classifications, defining and structuring objectives) - Educational contents (conceptualisation, selection criteria, didactic implementation) - The relationship between objectives, contents and the teaching – learning – assessment triangle - Projecting, implementing, monitoring and evaluation of the curriculum - Curriculum-related products, Applications - Structure of the National Curriculum in Romania. Documents for curriculum policy		
RECOMMENDED READING	1. xxx, 2008, *Psychopedagogy*. Manual for teaching certification and further teaching examinations, Ed. Polirom, Iaşi. 2. Momanu, M., 2002, Introduction to the theory of education, Ed. Polirom, Iaşi. 3. Creţu, C., 1998, Personalised and differentiated curriculum, Ed. Polirom, Iaşi. 4. Creţu, C., 2000,Theory of *curriculum and educational contents*, Editura UAIC, Iaşi. 5. Ionescu, M. (coord.), 2000, Modern didactic approach, Editura Dacia, Cluj-Napoca. 6. Husen, T., Postlethwaite (coord.), 1985, 1994, *The InternationalEnciclopedya of Education. Pergamon Press*, Oxford. vol. III. **7.** Landsheere, G. şi Landsheere, V., 1981, Defining operational objectives, EDP, Bucureşti. *Revista de Pedagogie*, Bucureşti, *Tribuna învãtãmântului*, Bucureşti. • CNC, 1998, 2000 School curriculum for Chemistry(lower and upper secondary school), CNC, 2000, Methodological guidelines, MEN. Project for reforming the pre-university education system. National Council for Curriculum, Curriculum and Curriculum Development within the context of the education system reform. Anticipatory curriculum policy, MEN document, Bucureşti, 1998, OECD report on Romanian Education System, 2000, www.oecd.com www.edu.ro link CNC		
TEACHING METHODS	Lectures, euristic conversation, problematisation, case study, Techniques of critical thinking,euristic conversation, case study, the cluster method, group activity, problematisation, brainstorming etc.		
ASSESSMENT METHODS	Written examination 60%, Periodic testing 20 %, Portfolio 20%		
LANGUAGE OF INSTRUCTION	Romanian		

COURSE TITLE	**THEORY AND METHODOLOGY OF TEACHING. THEORY AND METHODOLOGY OF EVALUATION**			
YEAR OF STUDY	II	SEMESTER	3	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)
LEVEL OF COURSE				NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR OF SCIENCE				5
NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME			
	PHD. PROFESSOR CARMEN MIHAELA CREȚU PHD. ASIST. BOGDAN CONSTANTIN NECULAU			
OBJECTIVE OF THE COURSE	❖ Adjusting to pedagogic language and the correct use of the concepts system specific to educational theory and practice; ❖ Acknowledging selection and value judgement criteria for traditional or alternative means of evaluation, in use at a certain time; ❖ Achieving knowledge and specific skills for teaching activities and school evaluation; ❖ Avoiding disfunctions that can interfere within the sequences of evaluation and grading of the students' achievements; ❖ Eliminating educational patterns by excluding the unique model and cultivating personal, creative and responsible inovation;			
PREREQUISITES	Education Psychology Introduction to Pedagogy Curriculum Theory and Methodology			
COURSE CONTENTS	1. Didactic Science, theory of the teaching process 2. Teaching process. Structural-systemic, functional and interactional approaches 3. Teaching: concept, strategies and teaching styles, efficiency and effectiveness in teaching, etc. 4. Didactic Strategies: Definition, components, functional interrelationships. Didactic methodology 5. Classic expositive methods of teaching and learning: definitions, classifications, descriptions, etc. 6. Modern expositive methods of teaching and learning. 7. Techniques of critical thinking and efficient learning. 8. Teaching Means: definition, classification, implementation in the teaching activity. 9. The New Information and Communication Technologies (NICT) and their psychopedagogic 10. Didactic evaluation – Essence and functions, forms of evaluation 11. Strategies, methods and instruments for evaluating school results. Present day theoretical and practical foundations. 12. Disfunctions of didactic evaluation and ways of limiting them. Self-assessment 13. Class management. Methodology. Conflict management of the class 14.School success and failure and talent management			
RECOMMENDED READING	1. Cerghit, I., Neacşu, I. Negreț, I., Pânişoară, I.-O. (2001). Pedagogic Lectures, Editura Polirom, Iaşi 2. Cucoş, C. (coord.) (2008), Psychopedagogy, Manual for teaching certification and further teaching examinations, Editura Polirom, Iasi. 3. Cretu, C., 1997, Psychopedagogy of success, Editura Polirom, Iasi. 4. Ionescu, M. (2007). Training and education, Ed. a III-a. Vasile Goldiş University Press, Arad. 5. Iucu, R.B. (2000). Class management. *Theoretical and methodological approaches*, Editura Polirom, Iasi. 6. Manolescu, M. (2006). School evaluation. Methods, techniques, instruments, Editura Meteor, Bucureşti: 7. Meyer, G. (2004). Why and how do we evaluate?, Editura Polirom, Iasi. 8. Pânişoară, I.-O. (2006). Efficient communication. Ed. a III-a., Editura Polirom, Iasi.			
TEACHING METHODS	Lectures, euristic conversation, problematisation, case study, Techniques of critical thinking,euristic conversation, case study, the cluster method, group activity, problematisation, brainstorming etc.			
ASSESSMENT METHODS	Written examination 60%, Periodic testing 20 %, Portfolio 20% Seminar : docimologic test 20 %, periodic testing 60 %, porofolio, 20 %			
LANGUAGE OF INSTRUCTION	Romanian			

COURSE TITLE	**DIDACTICS OF CHEMISTRY**	CODE: CN2410

YEAR OF STUDY	II	SEMESTER	4	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	EC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD ASSOCIATE PROFESSOR COZMA DANUT

OBJECTIVE OF THE COURSE	The presentation of principles of teaching chemistry, the identifying and defining objectives in terms of desired changes in student behaviour : (1) What should students be like at the end of the learning experience?(2)In other words, what kind of learning product is being sought? (3) What knowledges and understanding should the students possess?(4) What skills should they be able to display?(5) What interests and attitudes should they have developed? (6)What changes in habits of thinking, feeling and doing should have taken place?
PREREQUISITES	Pedagogy and Psychology of education
COURSE CONTENTS	The students will be able: (1) to aplicate the principles of teaching, (2)to build the battery of objectives defined in behavioral terms; (3) to select the situation to show desires changes in the learning: (4) to choose the most appropriate teaching or evaluation methods; (5) to interpret and apply the tests; (6) to observe the daily behavior of children and to provide numerous illustrations of typicall or atypicall behaviour;(7) to avoid the inadequacy of instruments in this field

RECOMMENDED READING	There are four groups of information: (1) the principles of teaching; (2) the methods of teaching; (3) the methods of evaluation; (4) the procedures required by the organization of the lesson, the principal form of the didactic activity.
TEACHING METHODS	The concept of formative evaluation not be restricted to the curriculum development.There are two major ways that the teaching methods can facilitate student motivation: (1) by providing immediate, attainable goals toward which to work; (2) by providing knowledge of learning progress.

ASSESSMENT METHODS	The identifing the learning outcomes to be tested; the procedure for selecting test content for a standardised achievement.There are four major steps in the diagnosis and the remediation of learning difficulties: (1)Determining which student are having learning difficulty;(2) Determining the specific nature of the learning difficulty; (3) Determining the factors causing learning difficulties; (4) Applying appropriate remedial procedures
LANGUAGE OF INSTRUCTION	Romanian

COURSE TITLE	**PRACTICAL TEACHING OF CHEMISTRY**	CODE: C_3501 C_3602

YEAR OF STUDY	III	SEMESTER	5,6	TYPE OF COURSE (**CC**-compulsory/**OC**-optional/**EC**-elective)	EC

LEVEL OF COURSE	NUMBER OF **ECTS** CREDITS ALLOCATED
BACHELOR STUDIES	5

NAME OF LECTURER	SCIENTIFIC AND DIDACTIC DEGREE, FIRST NAME, LAST NAME
	PHD ASSOCIATE PROFESSOR COZMA DANUT

OBJECTIVE OF THE COURSE	A review of each pupil's cumulative record should provide information concerning his scholastic aptitude, record of growth in the basic skills and other areas of achievement, personal-social development, health, home background, and the like.Evaluation procedures can contribute to greater retention and transfer of learning by: (1) focusing attention on those learning outcomes that are most permanent and most widely applicable; (2) providing practice in applying previously learned skills and ideas in new situations.
PREREQUISITES	Pedagogy and Psychology of education
COURSE CONTENTS	The students will be able: (1) to aplicate the principles of teaching, (2)to build the battery of objectives defined in behavioral terms; (3) to select the situation to show desires changes in the learning: (4) to choose the most appropriate teaching or evaluation methods; (5) to interpret and apply the tests; (6) to observe the daily behavior of children and to provide numerous illustrations of typicall or atypicall behaviour;(7) to avoid the inadequacy of instruments in this field

RECOMMENDED READING	There are four groups of information: (1) the principles of teaching; (2) the methods of teaching; (3) the methods of evaluation; (4) the procedures required by the organization of the lesson, the principal form of the didactic activity.
TEACHING METHODS	The concept of formative evaluation not be restricted to the curriculum development.There are two major ways that the teaching methods can facilitate student motivation: (1) by providing immediate, attainable goals toward which to work; (2) by providing knowledge of learning progress.

ASSESSMENT METHODS	The identifing the learning outcomes to be tested; the procedure for selecting test content for a standardised achievement.There are four major steps in the diagnosis and the remediation of learning difficulties: (1)Determining which student are having learning difficulty;(2) Determining the specific nature of the learning difficulty; (3) Determining the factors causing learning difficulties; (4) Applying appropriate remedial procedures
LANGUAGE OF INSTRUCTION	Romanian

III. GENERAL INFORMATION FOR STUDENTS

Research Equipment

Research equipment available in the Faculty of Chemistry is as follows: A. A. Spectrophotometer type T 3300, Recording UV and Visible Spectrophotometer, Flamephotometer Spekol Zeiss, Spekol type MK 6/6 digital pH-meter type OP 208, X-ray diffraction apparatus, Geiger Muller detectors, Gouy Magnetic Susceptibility Balance, Nuclear Magnetic Resonance Spectrometer NMR-AW-80 MHz Bruker, analytical and preparative gas chromatography equipment, derivatograph MOM-Budapest, recording polarograph, electronic balances and other equipment. Also available for research is a Am-Be neutron source with $\phi=10^5$ neutrons/s x cm^2 and others radioactive weak sources.

Each department is provided with two or more personal computers, e-mail, internet; the computer, consulting services and technical assistance are readily available for research needs.

Library facilities

All students of the "Al. I. Cuza" University can have access to the University libraries and to other libraries in Iaşi.

The Central University Library (Biblioteca Centrală Universitară *Mihai Eminescu*)

www.bcu-iasi.ro

e-mail: bcuis@bcu-iasi.ro

tel: + 40 (232) 264245

Within the "Al. I. Cuza" University of Iaşi, the Faculty of Chemistry and the Faculty of Physics share the same library - **Library of Physics and Chemistry** - located in building A, 11 Bd. Carol I, 700506, Iaşi. E-mail: bib.fiz@uaic.ro, tel: + 40 (232) 201151.

This library has an excellent collection of journals, reference books and monographs of more than 100,000 volumes. It renews its subscriptions to the most important periodicals of chemistry and physics worldwide, yearly.

All courses and practical tutorials as well as collection of examples and problems, worked out by the didactical staff of the Faculty of Chemistry, multiplied locally or centrally, are found in the library of Physics and Chemistry, in many copies, permanently at students disposal.

The library offers the following services: borrowing, 60 places in the lecture rooms, bibliographical information in the fields of chemistry, physics, biophysics, biochemistry, computer science, electronics and electrotechnics for research, bachelor's works, Ph.D. theses and courses.

Students and faculty staff have the possibility to consult the following working instruments: catalogs for books (authors and titles), alphabetical and topographic order for both physics and chemistry; on-line catalog; reference books such as general and special dictionaries and encyclopedias, Physical Abstracts and Chemical Abstracts; Current Contents are available on diskettes or on CD-ROMs for the physical, chemical, earth sciences and life sciences series, from 1993 up to present.

Access to the library services is possible based on the entrance permit, which can be obtained from the Permits Office, the Central Library building. Necessary documents: student card or certificate, ID card, a small-size photo.

Other libraries in Iaşi: The Romanian Academy Library (8 Bd. Carol I), Gheorghe Asachi Public Library of Iaşi (4 Palat Str.), The French Cultural Centre (26 Bd. Carol I), British Council (4 Pacuraru Str.), The German Cultural Centre (21 Bd. Carol I).

Accommodation

"Al. I. Cuza" University of Iaşi owns several campuses in the city. Students can be lodged in Târguşor, Codrescu and Titu Maiorescu campuses, as well as in Gaudeamus or Akademos halls of residence.

Gaudeamus Centre for International Exchange - Consists of Gaudeamus Canteen, situated in Titu Maiorescu Campus, next to C8 hall of residence and C17 Hall of Residence, situated in Codrescu Campus. This hall offers accommodation for SOCRATES-ERASMUS foreign students, but can also function as a hotel for Romanian students from "Al. I. Cuza" University (approx. €100 a month). Contact: ec. Teodora Tanase, tel: + 40 (232) 201077; Reception tel.: + 40 (232) 201700.

Internet facilities

In Gaudeamus Centre for International Exchanges, free-of-charge Internet connection can be provided in each room. Almost all faculties have computer rooms, where students can have free-of-charge access to Internet. It is possible to use these computers only based on the student card, which proves that the student is registered at the respective faculty.

Student Counseling Centres

CIPO – the Career Centre for students and alumni is situated in the Codrescu campus, C11 Hall of residence, 1st floor, rooms 28-29, 52-53. This is also the location for the Student Welfare Centre.

E-mail: cipo@cipo.uaic.ro; tel: + 40 (232) 201579, fax: + 40 (232) 201576.

Students Scholarships

Merit, study and social aid scholarships are given to students throughout the academic year (during teaching, evaluation, practical activities, B. Sc. or graduation exam), according to the national curriculum, *except from holidays.*

Scholarships for scientific performance are granted, through contest, for a period of 12 months in a row.

For the granting or redistribution of all types of scholarships, we consider the students' academic results from the first day of the respective year of study or semester. Merit and study scholarships are granted to students according to academic results. Social aid scholarships are granted upon request, taking into account the financial situation of the students' family or legal supporters.

Meals

Students can cook their own meals (Gaudeamus Centre offers facilities for cooking) or eat at the university student cafeteria (Gaudeamus Student Canteen), situated in the *Titu Maiorescu* Campus, near the main University building. Students can have breakfast, lunch and dinner at about €8 per day.

Apart from University restaurants, there are also fast-food restaurants, pizza-houses and classic restaurants.

Medical Services

Student's Medical Office no. 7 - Dr. Carmen Cărare, general practitioner, address: *Titu Maiorescu* Campus, Student Residence no. C8, ground floor, tel. 201324.

At the Students' Medical Office no. 7 (also, at the Student Hospital) all students of our University can have free of charge medical assistance: medical examination, prescriptions, treatments, etc. Students must show their student card/certificate, their passport and, if necessary, their medical insurance.

International cooperation

Being open to any international cooperation, the relationships of the Faculty of Chemistry with different similar faculties over the world are very numerous. The students can benefit from academic educational programmes abroad, financed by the Romanian Government, as well as from scholarships offered by foreign universities or foundations. The most important of the foreign faculties are specified below:

Austria:

- Vienna University of Technology;

Belgium:

- University of Antwerp;

France:

- University of Science and Technique of Lille;
- University of Poitiers;
- Universite Paris-Sud XI;
- Universite Lille2 Droit et Sante;
- Institut National Polytechnique de Toulouse;
- Ecole Nationale Superieure de Chimie de Lille;
- Universite Claude Bernard LYON 1;
- Universite d'Angers;
- Ecole Nationale Superieure de Chimie de Montpellier;

Germany:

- University of Konstanz;
- University of Regensburg;
- Techniche Universitat Braunschweig;

Greece:

- Aristotle University of Thessaloniki;
- National and Kapodistrian University of Athens;

Hungary:

- Pannon University;

Italy:

- Universita degli Studi di Cagliari;
- Universita della Calabria;
- Universita degli Studi di Camerino.

Language courses

International students who want to study at our university have the possibility to take introductory courses of Romanian language. They can also study in English, as most professors speak English fluently.

Romanian Language Courses – introductory courses for one year, summer courses.

Local transportation system

Iaşi has a good local transportation system: public trams, buses and minibuses, and a very good private transport system with minibuses (maxi taxi).

Sport facilities

As part of Physical Education classes in the curriculum (optional courses), students can choose between the following sports: fitness and aerobics, bodybuilding, table tennis, team games (basketball, volley-ball, handball, football), tennis (open air, electrically-lit synthetic sports ground), swimming, badminton. The University's Sports Centre and outdoor sport grounds is in 3 Toma Cozma Str., Building D of the University, underground floor.

The city of Iaşi

Iaşi has stood for centuries as the most important political, economic, social and cultural centre north-east of Romania. Owing to its location, Iaşi was the crossroads for the main trade routes coming from Poland, Hungary, Russia and Constantinople. The first written evidence of the economic importance of Iaşi and also of its very existence comes from a 1408 charter by which the Moldavia ruler Alexandru cel Bun granted commercial privilege to the Polish merchants of Lvov.

On the other hand, the same geographical location proved disadvantageous from a military point of view: the town and the whole region had to face innumerable attacks especially of the Tatars and Turks. A 15th century Moldavian ruler, long celebrated for his courage and for his faith (after each battle he had built a monastery) was Stefan cel Mare (Stephen the Great), a name you will find in many institution and street names.

At the middle of the 16th century Iaşi became the capital of Moldova (Moldavia) and witnessed, for the next three centuries, some of the greatest historical events. The first, though short, union of the three Romanian historical provinces was sanctioned in Iaşi in 1600. The famous 1848 Revolution, which was to spread all over the country, burst out here. Iaşi was also the place where the first Romanian higher education institution was founded, Academia Mihaileana, and the fisrst newspaper in Romania was issued.

Stylish, cozy and richly rewarding, Iaşi is brimming with history and art. The impressive number of interacting scientific and cultural institutions (six universities, over sixty schools and high schools, a branch of the Romanian Academy with several research institutes, two theatres, an opera, a philharmonic, dozens of museums and art galleries, libraries, several publishing houses, many radio and TV stations, cultural centres of main European countries, all in a 300, 000 inhabitant town) explain why Iaşi is considered to be the cultural capital city of Romania, as it was named for the first time at the inauguration of our University in 1860.

Other Universities in Iaşi: *George Enescu* University of Arts (www.arteiasi.ro), *Ion Ionescu de la Brad* University of Agricultural Sciences and Veterinary Medicine (www.univagro-iasi.ro), *Grigore T. Popa* University of

Medicine and Pharmacy (www.umfiasi.ro), *Gheorghe Asachi* Technical University (www.tuiasi.ro), *Petre Andrei* University (private, www.fapa.ro).

Iaşi is considered to be the first and the oldest cultural capital of the modern Romania, playing host to unique monuments of art (The Palace of Culture, The National Theatre, The Philharmonic, The Opera House, The *Trei Ierarhi* Church). With its more than 200 monuments of architecture and art (both religious and laic), museums, memorial houses, theatres, art galleries, parks, a Botanical Garden, Iaşi is a museum in itself, ranking among the most attractive tourist sites of Romania.

The Students' House (Casa Studenților) organizes conferences, shows, symposia, literary and musical evenings, theatre plays staged by students, meetings with scientists and artists.

- Cultural Centres

Right on Carol I Avenue, close to the university building, there are four foreign cultural centres, where students have easy access, and which attract through their architecture and the promise of special facilities.

The addresses of these cultural centres are as it follows:

The French Cultural Centre (26 Carol I Avenue, + 40(232) 267637);

The British Council (4 Pacurari Rd., + 40 (232) 258457);

The German Cultural Centre (19 Carol I Avenue, + 40 (232) 214051), The Cultural Centre of Latin America and the Carribean (22 Carol I Avenue);

There are also other cultural centres, like: The Modern Languages International Centre (35 Moara de Foc Rd.), The Centre for European History and Civilization (41 Cuza Vodă Rd.).

- Theatres

Vasile Alecsandri National Theatre (18, 9 Mai Rd., + 40 (232) 254499);

Romanian Opera House (18, 9 Mai Rd., + 40 (232) 211144);

Luceafarul Children's Theatre (5, Grigore Ureche Rd., + 40 (232) 256022);

The Theatre Agency (8 A, Stefan cel Mare Ave., + 40 (232) 255999);

Moldova Philharmonic House (29, Cuza Vodă Rd., + 40 (232) 412100).

- Museums

Moldova National Museum (The Palace of Culture), The Theatre Museum (4 Vasile Alecsandri Rd.), The Union Museum (14 Lapusneanu Rd.), The Natural History Museum (5, Independence Ave.), Romanian Literature Museum (4, Vasile Pogor Rd.), Mihai Eminescu Museum (Copou Garden), Mihail Kogălniceanu Museum (11, Mihail Kogălniceanu Rd.), Mihail Sadoveanu House (12, Sadoveanu Lane).

- Art Galleries

- The Art Galleries (64, Stefan cel Mare Ave., + 40 (232) 276079);
- *Cupola* Art Galleries, (2, Cuza Vodă Rd., + 40 (232) 276079).

- Cinemas

Victoria (15, Piata Unirii);

Republica (12, Lapusneanu Rd.);

Dacia (14, Piața Voievozilor);

- Hospitals

The Emergency Hospital (2, General Berthelot Rd., + 40 (232) 216584);

Sfanta Treime Hospital of Neurosurgery (2, Ateneului Rd., + 40 (232) 172051);

Sfantul Spiridon Hospital (1, Independentei Ave., + 40 (232) 240822);

Sfanta Maria Hospital for Children (62, Vasile Lupu Rd., + 40 (232) 264266);

The Recovery Hospital (14, Trotus Rd., + 40 (232) 254251);

Cuza Vodă Maternity Hospital (34, Cuza Vodă Rd., + 40 (232) 213000);

Elena Doamna Maternity Hospital (49, Elena Doamna Rd., + 40 (232) 210390);

The Pneumo-phtisiology Hospital (Iosif Cihac Rd., + 40 (232) 276079);

The Socola Psychiatry Hospital (36, Bucium Ave., + 40 (232) 430920);

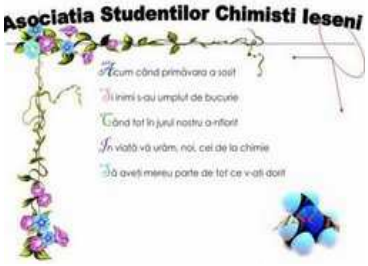
The Military Hospital (6, General Berthelot Rd., + 40 (232) 266268);

Parhon Hospital (50, Carol I Ave., + 40 (232) 211752);

The Centre for Cardiology (50, Carol I Ave., + 40 (232) 261097);

The Private Polyclinic (5, Codrescu Rd., + 40 (232) 264451).

Student organisations



There is a student organisation - **ASCIs** (**Asociația Studenților Chimiști Ieșeni**) - that offers a meeting place for their members and organise various activities. The main purpose of the association is to create an organized framework ment to reunite the students, also the alumni of the higher education institutions in the Chemistry domain.

ASCIs encourages students to contribute to the improvement of the educational process, to engage in international programmes and to have insterests about opportunities to study abroad.

Bd. Carol I, no. 11, „Alexandru Ioan Cuza" University, **A** Building, Faculty of Chemistry, phone: + 40 (232) 201363, + 40 (232) 201063; fax: + 40 (232) 201313

Web: www.asc-is.blogspot.com