TNU-UNIVERSITY OF EDUCATION

PROGRAMME SPECIFICATION

FOR BACHELOR OF CHEMISTRY EDUCATION

FACULTY OF CHEMISTRY (FC)

20, LUONG NGOC QUYEN ROAD, THAI NGUYEN CITY, VIET NAM

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THAI NGUYEN - 2018

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THAI NGUYEN UNIVERSITY
THAI NGUYEN UNIVERSITY OF EDUCATION

SOCIALIST REPUBLIC OF VIETNAM
Independence - Freedom - Happiness

PROGRAMME SPECIFICATION

FOR BACHELOR OF CHEMISTRY EDUCATION

Decision No 6117/ QĐ-ĐT dated on December 28, 2018 by the Rector of TNU- University of Education.

I. PROGRAMME DESCRIPTION

1. Programme introduction

The Bachelor of Chemistry Education (BCE) programme was revised in 2018 with the goal of developing some training majors of TUE to achieve national standards, to improve the training quality at university and to adapt to the fundamental and comprehensive improvement requirements of Vietnamese education.

The Bachelor of Chemistry Education programme is derived from the previous Chemistry educational training programme and has been supplemented and developed to meet the new requirements for general education. The specialized courses of the Bachelor of Chemistry Education programme are taught by lecturers with a PhD degree from the Faculty of Chemistry.

The Faculty of Chemistry continuously improves and develops its facilities as well as educational activities and research to adapt to the evolving demands within the chemistry field. The Faculty of Chemistry has provided, and created a comprehensive educational learning environment for students, both in theory and practice. This helps to encourage students to learn actively, using their initiative, creatively and cooperatively.

2. General information

Name of programme	**Bachelor of Chemistry Education**
Code number	D140212
Awarding institution	Thai Nguyen University of Education
Type of diploma	Bachelor of Chemistry Education
Level of training	Undergraduate
Number of required credits	130
Type of study	Full-time
Length of study	4 years (maximum is 6 years, can be shorter than 4 years)
Enrollment object, and conditions	- Direct admission is applied to the high-school students, who won national or international prizes. - National high school graduation examination results of candidates, which are taken from high to

	low. - Nationwide admissions.
Assessment scale	10
Graduation requirement	• The accumulated number of credits and volume of the training programme: 130 • The cumulative average score of the entire programme meets the minimum of 2.00 or higher. • Having a Physical Education and Defense Education Certificate. • Have achieved required foreign language learning outcomes. • Have achieved the required level of information technology learning outcomes.
Job position	• To be a chemistry teacher at schools, international schools, colleges, and universities. • To be a researcher in a research center or institute of chemistry and institute of educational science. • To be an expert, an officer, or a manager at schools, universities, and Departments of Education and Training. • To work in companies or in a field of work related to chemistry.
Higher education after graduation	Graduates may continue on to studying masters and doctoral qualifications in this country or abroad.
Reference programme	• The Bachelor of Education Chemistry programme at Hanoi University of Education • The Degree of bachelor in Chemistry (the Advanced programme) of Vietnam National University • The Bachelor of Education Chemistry programme at Ho Chi Minh City University of Education • The Chemistry Education, B.S, Utah Valley University • The Chemistry, BS - Wright State University
Last revision	8/2018

3. Programme Objectives (POs)

3.1. General objective

The objective of this training programme is to train a Bachelor of Chemical Education with good political and moral qualities, with knowledge and expertise and powerful professional skills, the capability to self-study and self-research. The learners should also be both creative and responsible in their job, adapting to the changing working environment in order to serve the education-training and socio-economic development of the whole country, particularly including the Northern mountainous region and international integration.

3.2. Specific objectives

PO1. Have both a basic and professional knowledge about chemistry education.

PO2. Have a good background in philosophy and political education to apply to the process of teaching, research, chemistry and education students.

PO3. Have a deep understanding of psychology, education and teaching theory to apply to the task of chemistry teaching at high school.

PO4. Have knowledge and skills in information technology and using English in communication and professional activities.

PO5. Have experimental practice skills, teaching practice, researching and teaching chemistry. In addition they should have communicative skills, teamwork skills, scientific thinking skills and soft skills in solving practical problems at high school.

PO6. Have ability to study at a high level, engage in independent learning, gain experience, create innovation and plan for lifelong learning.

PO7. Have good moral qualities, social accountibility, autonomy, and be able to act responsibly.

4. Expected Programme Learning Outcomes (PLOs)

After graduation, students should meet the following expected learning outcomes:

4.1. Knowledge

*** General knowledge**

PLO1. Understand and apply the basic knowledge of Marxism-Leninism, Ho Chi Minh's Ideology, the Revolutionary Directions of the Vietnamese Communist Party, Vietnamese Law, National Defense and Security in their occupational activities and life.

PLO2. Understand and apply the basic knowledge of psychology, pedagogics and school management in organizing activities in teaching chemistry and organizing educational activities at schools.

*** Professional knowledge**

PLO3. Be able to apply basic and in-depth professional knowledge of Inorganic chemistry, Organic chemistry, Analytical Chemistry and Physical Chemistry in teaching and organizing experiential activities for high school students.

PLO4. Be able to apply the knowledge of chemist practices in teaching chemistry and organizing experiential activities for students at high school.

PLO5. Be able to apply basic research methods in the natural sciences and chemistry education, using research results to contribute to the improvement of the teaching and learning process.

4.2. Skills

*** General skills**

PLO6. Communicate effectively with students, colleagues, parents, and others related.

PLO7. Counsel and supporting students in teaching, educating and vocational training.

PLO8. Obtain a qualification in Informatics such as IC^3, ICDL, MOS or equivalent, and applying these information skills to design, organize, evaluate teaching activities and scientific research.

PLO9. Obtain a certificate in English at Level B1 of CEFR (Common European Framework of Reference for Languages), and use this English proficiency in effective communication.

PLO10. Perform self-occupational experiential activities to look for opportunities for entrepreneurship and lead others to look for similar opportunities.

***Professional skills**

PLO11. Perform proficiently teaching methods in chemistry, and the methods, forms, and techniques of assessment towards the advancement of student competence development and progress. To be able to resolve situations as they occur in teaching and learning activities.

PLO12. Perform proficiently the chemical experiments in teaching chemistry and natural scientific subjects at high school.

PLO13. Employ effectively the methods of guiding students to engage in research in the field of chemistry and natural sciences at high school.

4.3. Autonomy and responsibility capacity

PLO14. Understand, perform and adhere to the moral principles for teachers and democratic regulations in schools.

PLO15. Work independently and work with a team within the changing working environment, with personal responsibilities and for the group. To be able to show the individual ideas on issues that need to be resolved.

PLO16. Perceive the demand for and design a plan for lifelong learning.

5. Mapping of Programme Objectives (PO) – Expected Programme Learning Outcomes (PLOs)

PO	PLOs															
	General knowledge		Professional knowledge			General skills					Professional skills			Autonomy and responsibility		
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12	PLO 13	PLO 14	PLO 15	PLO 16
PO1			x	x	x											
PO2	x															
PO3		x			x											
PO4								x	x							
PO5						x	x			x	x	x	x			
PO6																x
PO7														x	x	

6. Teaching & learning strategies and assessment methods

6.1. Teaching & learning strategies

6.1.1. Preparation of lecturers

6.1.2. Teaching methods/strategies

Each course in the programme has makes use of various different teaching methods, such as presentations, seminars, exercises, discussions, experiments, practice, E-learning.

- The method of presentation has been used to teach theoretical knowledge. The purpose of this method is to provide students with a deep understanding about the theory content of the course.
- The exercise method has been used to teach the exercises used in tutorials. The purpose of this method is to apply course knowledge to solve problems and explain natural phenomena related to the course, to practice the skills of using a chemical language to give a presentation on how to solve exercises, interpersonal skills, writing, and presentation skills, which helps build self-control and responsibility capacity and so assist students to improve their lifelong learning.

- Seminar and discussion methods have been used for seminar knowledge and discussion tutorials. Like the exercise method above, its purpose is to train the students in the skills of using a chemical language to present and create discourse around the subject matter to be debated. This enables the practice of reporting, self-study, interacting and teamworking skills, and again helps build self-control and responsibility capacity and so provide even more help to improve the lifelong learning of the student.
- Practice methods are used for independent practice courses or integrated within the content of the course. The purpose of this method is to train students in experimental skills, practical chemistry, assist in students consolidating the theoretical content of the course. Therefore, this method improves the practical chemistry capacity of students in the teaching and researching process.
- The E-learning method is applied to some courses. The goal of the method is to empower the best for learners in terms of space, time and knowledge. However, this teaching method requires a great investment in teachers, so it can only be implemented in a few courses.

6.1.3. Improvements, advancement teaching quality

- The training programme is reviewed and adjusted every 2 years to meet the innovative requirements about programmes and textbooks.
- In each semester, the departments build the plans observing classes of lecturers, especially young lecturers, to interchange and share knowledge and teaching methods, in order to improve the lecturers' capacity.
- The courses of the programme are regularly surveyed student feedback about the quality, talent, heart, faith, responsibility of the teacher.

6.2. Assessment method

6.2.1. Assessment scale

Use the 10-point scale for all assessments in the course.

6.2.2. Form, evaluation criteria and weighting points

Credits	**Number of process evaluation points**			**Total number of marks**
	Diligence	**Regularly**	**Number of recurring exams**	
2	1	1	1	3
3-4	1	2	2	5
5	1	2	3	6

- *Percent points*
  - *Evaluation process: 50% (including periodic test 25%, 25% of the remaining score by the Faculty regulations)*
  - *Final assessment: 50%*

Nº	Form	Rate	Evaluation criteria	Maximum score
Evaluation process (50%)				
1.	Diligence	5 %	Positivity in preparing lessons and actively participating in class.	5
			Time required to attend the lesson	5
2.	Exercise	10 %	Perform and fulfill tasks by the deadline	2
			Product content matches the requirements	5
			Appropriate use of technology that matches the requirements	2
			Creative ideas	1
3.	Seminar	10 %	Full content given on request	4
			The reasoning is scientific and logical	1
			Reports are presented clearly	2
			Interaction includes good eye contact and gesturing.	1
			Questions are answered fully and satisfactorily.	1
			The team coordinates well, shares workload and supports each other while reporting and responding to questions.	1
4.	Periodic test	25%	Depending on answers assessed by the lecturer.	10
	Final assessment (50%)			
5.	Essay	50%	Depending on the answers and the assessment of the exam for course completion.	10

II. DESCRIPTION OF THE CURRICULUM

1. Curriculum structure

Nº	Knowledge block, credits	Course type	Credits
1.	General educational knowledge, 24 credits	Compulsory	22
		Elective	2
2.	Professional education knowledge, 68 credits		
2.1.	Fundamental knowledge, 12 credits	Compulsory	10
		Elective	2
2.2.	Specialized knowledge, 56 credits	Compulsory	50

		Elective	6
3.	Education knowledge, 31 credits	Compulsory	27
		Elective	4
4.	Thesis, or replacement module instead of the graduation thesis, 7 credits	Compulsory	0
		Elective	7
Total			**130**

- The general educational knowledge block consists of 18 modules. This knowledge block is intended to help students to gain a grounding knowledge in social sciences, political science and law, Ho Chi Minh ideology, the revolutionary path of the Communist Party of Vietnam, English and physical education. This is where learners apply that knowledge in planning and organizing chemistry teaching and educational activities in high schools.
- The professional education knowledge block consists of 31 modules. This knowledge block helps students to acquire a comprehensive professional knowledge in chemistry teaching and educating students in high school, and at the same time learners develop scientific research skills and are able to continue studying at a higher level.
- The educative knowledge block consists of 18 modules. This knowledge block seeks to get students to understand and apply teaching methods, assessment methods to test the learning and training results of the students, and helps learners to gain the ability to apply the learned knowledge in research, teaching, and organizing experience activities in chemistry science for students in high school.
- The next knowledge block consists of either a thesis or its equivalent in 6 replacement modules. This knowledge block allows students to gain experience in performing comprehensive analysis and application with the subject teaching methods to enhance their ability in chemistry teaching and diversified education for students, whilst improving their scientific research skills and organizing experience activities for students in high school.

2. Courses List

No.	Code	Course name	Credit	Credit hour kind					Prerequisite course	Before course	Semester
				On class							
				Theory	Exercise	Experiment	Seminar	Theory			
1.	**General knowledge**		**24**								
1.1. Compulsory Courses											
1	MLP151N	Principles of marxism - Leninism	5	40	30	20	20				3
2	HCM121N	Ho Chí Minh's Thoughts	2	15	10	10	10				6
3	VCP131N	Principles of Vietnam communist party	3	22,5	15	15	15			HCM121N	7
4	EDL121N	General law	2	20	5	5	10			MLP151N	6
5	ENG131N	English 1	3	15	15	30	15				1
6	ENG132N	English 2	3	15	15	30	15			ENG131N	2
7	ENG143N	English 3	4	20	20	40	20			ENG132N	3
1.2. Selective courses (2 credits)			**2**								
8	GME121M	Public and educational administration	2	15	10	12	8				1
9	GIF121N	Basic informatics	2	20		20					1
10	EDE121N	Environment and development	2	20	8		12				1
11	VIU121N	Vietnamese in use	2	15	15	15					1
12	VCF121N	Vietnamese culture's foundation	2	21	4	6	8				1
13	LOG121N	Basic logic	2	20	10	5	5				1
14	CDE121N	Culture and development	2	21		6	12				1
1.3	**Physical education**										
15	PHE111N	Physical education 1									1
16	PHE112N	Physical education 2								PHE111N	2
17	PHE113N	Physical education 3								PHE112N	3
1.4	Defense Education										
18	MIE131N	Defense Education		05 weeks							4
2. Professional education knowledge			**68**								
2.1. Fundamental knowledge			**12**								
Compulsory Courses			**10**								
19	MPC221M	Advanced mathematics for chemistry	2	20	18		2				3
20	PHY241M	Physics	4	30	24	30	6				2
21	BIO241M	Biology	4	42		30	6				1
Selective courses (2 credits)			**2**								

No.	Code	Course name	Credit	Credit hour kind					Prerequisite course	Before course	Semester
				On class							
				Theory	Exercise	Experiment	Seminar	Theory			
22	ECB221N	Ecology and biodiversity	2	22		16					3
23	AST221N	General astronomy	2	22	13		3				3
24	ESI221M	Earth Science	2	20	10		10				3
2.2. Specialized knowledge			**56**								
Compulsory Courses			**50**								
25	CMS341M	Chemistry of material structure	4	42	21		15				1
26	TCP331N	Fundamental theory of chemistry process	3	33	15		9			CMS341M	2
27	PBC321N	Practice basic chemistry	2			60					2
28	CNE331N	Chemistry of non-metallic elements	3	33	15		9			TCP331N	4
29	CME341N	Chemistry of metallic elements	4	42	21		15			TCP331N	4
30	PIC321N	Practice inorganic chemistry	2			60					4
31	THC331N	Thermodynamic chemistry	3	30	15		15			TCP331N	3
32	KCH321M	Kinetic chemistry	2	18	12		12			THC331N	4
33	ELE331N	Electrochemical and physicochemical experiment	3	18	12	30	12			KCH321M	5
34	TOC321N	Theoretical principle of organic chemistry	2	21	9		9			TCP331N	3
35	HDC321N	Hydrocarbon	2	21	9		9			TOC321N	4
36	DHE331N	Derivatives of hydrocarbon excess	3	30	15		15			HDC321N	5
37	CCH321N	Complex organic molecular and polymer	2	21	9		9			DHE331N	6
38	POC321N	Practical organic chemistry	2			60					6
39	TAC321N	Basis theory analytical chemistry	2	18	15		9			TCP331N	4
40	QAC331N	Quantitative analytical chemistry	3	30	15		15			TAC321N	5
41	ACE321N	Analytical chemistry experiment	2			60					5

No.	Code	Course name	Credit	Credit hour kind					Prerequisite course	Before course	Semester
				On class							
				Theory	Exercise	Experiment	Seminar	Theory			
42	CFL321N	Chemistry for life 1	2	21	9		9			CNE331N CME341N DHE331N	6
43	CFL322N	Chemistry for life 2	2	15	6	15	9			CFL321N	7
44	CCC321N	Chemistry of coordination compounds	2	21	12		6			TCP331N	7
Selective courses (6 credits)			**6**								
45	SUC321N	Application spectrometry method on chemistry	2	18	12		12			ELE331N	7
46	ECS321N	Statistical data handling of experimental chemistry	2	21	12		6			TAC321N	7
47	CHM321N	Material chemistry	2	21	12		6			CNE331N CME341N	7
48	SOC321N	Synthesis organic chemistry	2	21	9		9			CCH321N	7
49	QCH321M	Quantum chemistry	2	18	12		12			CMS341M	7
3. Educative knowledge			**31**								
Compulsory Courses			**27**								
50	EPS331M	Educational psychology	3	30		15	15				1
51	PEP341M	Pedagogics	4	42	8	12	16			EPS331M	2
52	TTC441N	Theory of teaching chemistry	4	36	27		9	12		MLP151N PEP341M	4
53	TMC431N	Chemical teaching methods in high school	3	30	8		10	12		TTC441N CNE331N CME341N	5
54	ECT421N	Chemical experiments in high school	2			60				CNE331N CME341N DHE331N	6
55	ESC421M	Chemical exercises in high school	2	12	18		18			CNE331N CME341N DHE331N	6
56	PTT421N	Pedagogical training in teaching chemistry 1	2			60				PEP341M	3
57	PTT422N	Pedagogical training in teaching chemistry 2	2			60				TMC431N ECT421N	7
58	TRA421N	Pedagogical practice 1	2	3 weeks in high school						TTC441N PTT421N	5

No.	Code	Course name	Credit	Credit hour kind					Prerequisite course	Before course	Semester
				On class							
				Theory	Exercise	Experiment	Seminar	Theory			
59	TRA432N	Pedagogical practice 2	3	7 weeks in high school						TRA421N PTT422N TMC431N ECT421N	8
Selective courses (4 credits)			**4**								
60	IAT421N	Informatic application in chemistry teaching	2	12		30	6			TMC431N	6
61	TOE421M	Teaching in the online environment	2	15	21		9			TMC431N	6
62	HOC421N	History of chemistry	2	15	12		18			TMC431N	6
63	TDC421M	Differentiated teaching in chemistry teaching at high school.	2	15	24		6			TMC431N	6
64	ETC421M	Equipment teaching chemistry	2	15		30				TMC431N	6
65	PMC421M	Problem-solving method in chemical teaching in high school	2	15	12		18			TMC431N	6
66	NSC421N	Natural scientific topics of chemistry in high school.	2	15	9		21			TMC431N	6
67	UEC421M	Using English in chemical teaching	2	15	15		15			TMC431N	6
4. Thesis, courses replace the graduation thesis			**7**								
Thesis											
68	CTE971N	**Thesis graduation**	7								
Courses replace the graduation thesis (7 Credits)			**7**								
69	TPD931N	Chemical teaching in schoolunder the positive direction	3	30	15		15			TMC431N	8
70	TAT931N	Measurement and assessment in chemical teaching	3	30	15		15			TMC431N	8
71	CCN921N	Natural Product	2	21	9		9			CCH321N	8
72	CPM921N	Corrosive and protection of metal	2	18	12		12			ELE331N	8

No.	Code	Course name	Credit	Credit hour kind					Prerequisite course	Before course	Semester
				On class							
				Theory	Exercise	Experiment	Seminar	Theory			
73	CCH921M	Colloidal chemistry	2	20	8		12			ELE331N	8
74	PTE921N	General technicals for environmental treatment	2	21	12		6			QAC331N	8
Total			**130**								

3. Training plan

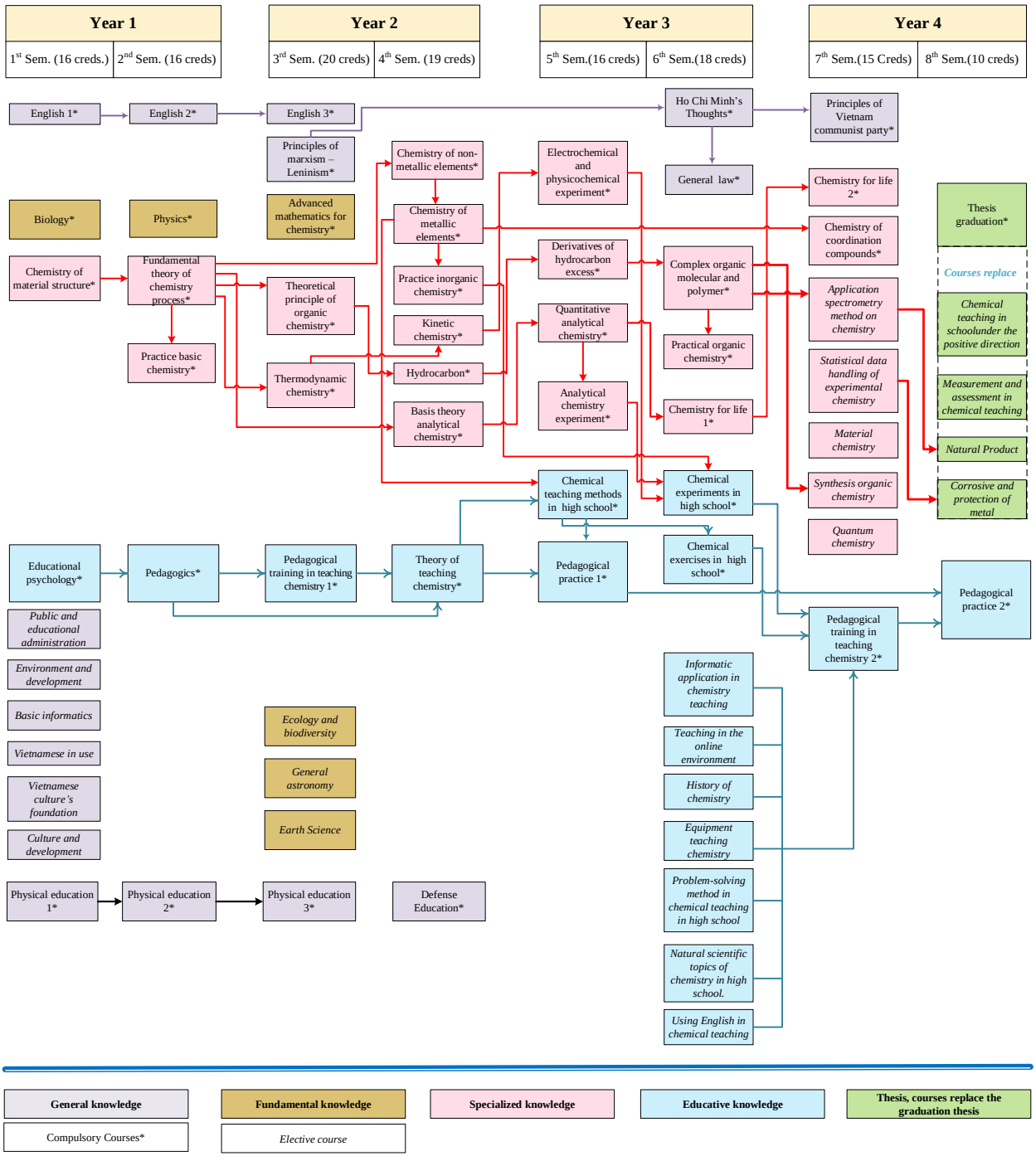
The first year		The second-year	
1st Semester	**2nd Semester**	**3th Semester**	**4th Semester**
ENG131N, English 1 (3)*	ENG132N, English 2 (3)*	MLP151N, Principles of Marxism - Leninism *	MIE131N, Defense Education *
MAT221M, Advanced mathematics *	PHE112N, Physical education 2*	ENG143N, English 3*	CME341N, Chemistry of metallic elements *
CMS341M, Chemistry of material structure *	PHY241M, Physics	PHE113N, Physical education 3*	PIC321N, Practice inorganic chemistry *
EPS331M, Educational psychology *	TCP331N, Fundamental theory of chemistry process *	ECB221N, Ecology and biodiversity	KCH321M, Động hóa học*
BIO241M, Biology *	PBC321N, Practice basic chemistry *	AST221N, General astronomy	HDC321N, Hydrocarbon*
PHE111N, Physical education 1*	PEP341M, Pedagogics *	GBI221N, Earth Science	TAC321N, Basis theory analytical chemistry *
GME121M, Public and educational administration		CNE331N, Chemistry of non-metallic elements *	TTC441N, Theory of teaching chemistry *
GIF121N, Basic informatics		THC331N, Thermodynamic chemistry *	
EDE121N, Environment and development		TOC321N, Theoretical principle of organic chemistry	

		*	
VIU121N, Vietnamese in use		PTT421N, Pedagogical training in teaching chemistry 1*	
VCF121N, Vietnamese culture's foundation			
LOG121N, Basic logic			
CDE121N, Culture and development			
The third year		**The fourth year**	
5th Semester	**6th Semester**	**7th Semester**	**8th Semester**
ELE331N, Electrochemical and physicochemical experiment *	HCM121N, Ho Chí Minh's Thoughts *	VCP131N, Principles of Vietnam communist party *	TRA432N, Pedagogical practice 2
DHE331N, Derivatives of hydrocarbon excess *	EDL121N, General law *	CFL322N, Chemistry for life 2*	CCN921N, Natural compound
QAC331N, Quantitative analytical chemistry *	CCH321N, Complex organic molecular and polymer *	CCC321N, Chemistry of coordination compounds *	CPM921N, Corrosive and protection of metal
ACE321N, Analytical chemistry experiment *	POC321N, Practical organic chemistry	SUC321N, Application spectrometry method on chemistry	CCH921M, Colloidad chemistry
TMC431N, Chemical teaching methods in high school *	CFL321N, Chemistry for life 1*	ECS321N, Statistical data handling of experimental chemistry	PTE921N, General technicals for environmental treatment
TRA421N, Pedagogical practice 1*	ECT421N, Chemical experiments in high school *	CHM321N, Material chemistry	
	ESC421M, Chemical exercises in high school *	SOC321N, Synthesis organic chemistry	
	IAT421N, Informatic application in chemistry teaching	QCH321M, Quantum chemistry	
	TOE421M, Teaching in the online environment	PTT422N, Pedagogical training in teaching chemistry 2*	
	HOC421N, History	TPD931N,	

	of chemistry	Chemical teaching in schools under the positive direction	
	TDC421M, Differentiated teaching in chemistry teaching at high school.	TAT931N, Measurement and assessment in chemical teaching	
	ETC421M, Equipment teaching chemistry		
	PMC421M, Problem-solving method in chemical teaching		
	NSC421N, Natural scientific topics of chemistry in high school.		
	UEC421M, Using English in chemical teaching		

Note: * Compulsory course

CURRICULUM OF BCEP ROADMAP (2018)



4. Matrix between knowledge blocks and expected programme learning outcomes (PLOs)

Notes: 0-None, 1 – Low, 2 - Medium, 3 - High

Knowledge block	Expected Programme Learning Outcomes															
	General knowledge		Professional knowledge			General skills				Professional skills			Autonomy and responsibility			
	PLO1	PLO2	PLO 3	PLO 4	PLO5	PLO 6	PLO 7	PLO8	PLO 9	PLO 10	PLO11	PLO 12	PLO 13	PLO 14	PLO 15	PLO 16
General	3	2	0	0	0	1	1	3	3	1	1	0	0	3	2	1
Professional	0	0	3	3	2	1	2	0	0	2	1	3	2	1	2	2
Educative	0	3	2	2	2	3	3	1	1	2	3	3	2	2	2	2
Thesis, courses replace the graduation thesis	0	0	3	3	3	0	1	0	0	1	1	2	2	0	2	2

5. Matrix between courses and expected programme learning outcomes

Notes: 0-None, 1 – Low, 2 - Medium, 3 - High

No.	Courses	Expected Programme Learning Outcomes														
		General knowledge		Professional knowledge			General skills					Professional skills			Autonomy and responsibility		
		PLO1	PLO2	PLO 3	PLO 4	PLO5	PLO 6	PLO 7	PLO8	PLO 9	PLO 10	PLO11	PLO 12	PLO 13	PLO 14	PLO 15	PLO 16
1	MLP151N, Principles of Marxism - Leninism	3	0	0	0	0	2	1	0	0	2	0	0	0	2	2	2
2	HCM121N, Ho Chí Minh's Thoughts	3	0	0	0	0	2	1	0	0	2	0	0	0	2	2	2
3	VCP131N, Principles of vietnam communist	3	0	0	0	0	2	1	0	0	1	0	0	0	3	2	2

	party																
4	EDL121N, General law	3	0	0	0	0	1	2	0	0	1	0	0	0	3	1	1
5	ENG131N, English 1	0	0	0	0	0	1	0	1	1	0	0	0	0	0	1	1
6	ENG132N, English 2	0	0	0	0	0	2	0	2	2	0	0	0	0	0	2	2
7	ENG143N, English 3	0	0	0	0	0	2	0	2	3	0	0	0	0	0	3	3
8	GME121M , Public and educational administration	2	2	0	0	0	1	0	0	0	1	0	0	0	3	0	1
9	GIF121N, Basic informatics	0		0	0	0	1	0	3		1	0	0	0	0	1	1
10	EDE121N, Environment and development	1	2	0	0	1	2	2	1	1	2	0	0	1	1	3	2
11	VIU121N, Vietnamese in use	0	1	0	0	0	2	1	0	1	0	1	1	1	1	1	1
12	VCF121N, Vietnamese culture’s foundation	0	1	0	0	0	2	1	0	1	0	1	1	1	1	1	1
13	LOG121N, Basic logic	1		0	0	0	2	1	0	0	0	0	0	0	0	2	1
14	CDE121N, Culture and development	0	1	0	0	0	2	1	0	1	0	1	1	1	1	1	1
15	PHE111N, Physical education 1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
16	PHE112N, Physical education 2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
17	PHE113N, Physical	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1

	education 3																
18	MIE131N, Defense Education	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
19	MAT221M, Advanced mathematics	0	0	2	0	1	1	0	0	0	0	0	0	0	0	1	1
20	PHY241M, Physics	0	0	0	0	1	0	0	1	0	0	0	0	0	1	1	1
21	BIO241M, Biology	0	0	0	0	1	1	1	1	1	1		1	1		3	2
22	ECB221N, Ecology and biodiversity	0	1	1	1	3	2	2	1	1	2	1	1	3	2	3	3
23	AST221N, General astronomy	0	0	0	0	1	0	0	1	0	0	0	0	0	1	2	1
24	GBI221N, Earth Science	1	1	3	2	2	1	1	2	1	1	1	1	2	1	3	2
25	CMS341M, Chemistry of material structure	0	0	3	0	0	2	0	0	0	0	2	0	0	1	2	1
26	TCP331N, Fundamental theory of chemistry process	0	0	3	0	0	2	0	0	0	0	2	0	0	1	2	1
27	PBC321N, Practice basic chemistry	0	0	3	3	1	2	0	0	0	0	2	3	1	1	2	1
28	CNE331N, Chemistry of non-metallic elements	0	0	3	0	1	2	0	0	0	2	2	0	0	1	2	2
29	CME341N, Chemistry	0	0	3	0	1	2	0	0	0	2	2	0	1	1	2	2

	of metallic elements																
30	PIC321N, Practice inorganic chemistry	0	0	3	3	1	2	0	0	0	0	2	3	1	1	2	1
31	THC331N, Themodynamic chemisty	0	0	3	0	1	2	0	0	0	0	1	0	1	1	2	1
32	KCH321M, Kinetic chemistry	0	0	3	0	1	2	0	0	0	0	1	0	1	1	2	1
33	ELE331N, Electrochemical and physicochemical experiment	0	0	3	2	1	2	0	0	0	0	1	2	1	1	2	1
34	TOC321N, Theorical principle of organic chemistry	0	0	3	0	1	2	0	0	0	0	2	0	1	1	2	2
35	HDC321N, Hydrocarbon	0	0	3	0	1	2	0	0	0	0	2	0	1	1	2	2
36	DHE331N, Derivatives of hydrocacbon excess	0	0	3	0	1	2	0	0	0	0	2	0	1	1	2	2
37	CCH321N, Complex organic molecular and polymer	0	0	3	0	1	2	0	0	0	0	2	0	1	1	2	2
38	POC321N, Practical organic chemistry	0	0	3	3	1	2	0	0	0	0	1	3	0	1	2	1
39	TAC321N, Basis theory	0	0	3	0	1	2	0	0	0	1	1	0	1	1	2	2

	analytical chemistry																
40	QAC331N, Quantitative analytical chemistry	0	0	3	0	1	2	0	0	0	0	1	0	1	1	2	2
41	ACE321N, Analytical chemistry experiment	0	0	3	3	1	2	0	0	0	1	1	3	0	1	2	1
42	CFL321N, Chemistry for life 1	0	0	3	0	1	2	0	0	0	1	1	0	1	1	2	1
43	CFL322N, Chemistry for life 2	0	0	3	2	1	2	0	0	0	1	1	2	1	1	2	1
44	CCC321N, Chemistry of coordination compounds	0	0	3	0	0	2	0	0	0	0	2	0	0	1	2	1
45	SUC321N, Application spectrometry method on chemistry	0	0	3	0	1	2	0	0	0	0	1	0	1	1	2	1
46	ECS321N, Statistical data handling of experimental chemistr	0	0	2	0	1	2	0	0	0	0	1	0	1	1	2	2
47	CHM321N, Material chemistry	0	0	3	0	1	2	0	0	0	0	1	0	0	1	2	1
48	SOC321N, Synthesis organic chemistry	0	0	3	0	1	2	0	0	0	0	1	0	1	1	2	2
49	QCH321M,	0	0	3	0	1	2	0	0	0	0	1	0	1	1	2	1

	Quantum chemistry																
50	EPS331M, Educational psychology	0	3	0	0	0	3	3	0	0	1	0	0	0	2	3	2
51	PEP341M, Pedagogics	0	3	0	0	0	2	0	0	0	1	0	0	0	2	1	1
52	TTC441N, Theory of teaching chemistry	0	0	1	1	1	1	0	0	0	0	2	0	1	1	2	1
53	TMC431N, Chemical teaching methods in high school	0	1	2	2	2	2	0	1	0	0	2	0	0	1	2	1
54	ECT421N, Chemical experiments in high school	0	0	2	0	0	1	0	0	0	0	2	3	0	1	2	1
55	ESC421M, Chemical exercises in high school	0	0	3	0	0	1	0	0	0	0	2	0	0	1	2	1
56	PTT421N, Pedagogical training in teaching chemistry 1	0	2	1	2	1	2	0	0	0	0	2	0	0	1	2	1
57	PTT422N, Pedagogical training in teaching chemistry 2	0	2	2	0	2	2	0	0	0	0	2	2	0	1	2	1
58	TRA421N, Pedagogical practice 1	1	2	1	0	0	3	1	0	0	1	1	0	0	1	2	1
59	TRA432N, Pedagogical practice 2	1	2	3	2	1	3	1	0	0	1	3	2	1	2	2	2
60	IAT421N, Informatic application	0	0	1	1	1	0	0	3	0	0	1	0	0	1	2	1

	in chemistry teaching																
61	TOE421M, Teaching in the online environment	0	0	2	0	1	2	0	3	0	0	2	0	0	1	2	2
62	HOC421N, History of chemistry	0	0	2	0	1	2	0	0	0	0	1	0	0	1	1	1
63	TDC421M, Differentiated teaching in chemistry teaching at high school.	0	1	0	0	2	2	0	0	0	0	2	0	0	1	2	1
64	ETC421M, Equipment teaching chemistry	0	0	0	0	1	2	0	1	0	0	0	0	0	1	2	0
65	PMC421M, Problem-solving method in chemical teaching in high school	0	0	1	1	1	2	0	0	0	0	2	0	0	1	2	1
66	NSC421N, Natural scientific topics of chemistry in high school	0	0	3	1	0	2	0	0	0	0	2	0	0	1	2	1
67	UEC421M, Using english in chemical teaching	0	0	1	0	0	2	0	0	2	0	1	0	0	1	2	1
68	CTE971N	0	0	3	3	3	0	1	0	0	1	1	2	2	1	2	2

	Thesis																
69	TPD931N, Chemical teaching in schools under the positive direction	0	1	2	2	2	1	0	0	0	0	3	0	0	1	2	1
70	TAT931N, Measurement and assessment in chemical teaching	0	0	0	0	1	2	0	0	0	0	3	0	0	1	2	1
71	CCN921N, Natural Product	0	0	3	0	1	2	0	0	0	0	1	0	1	1	2	2
72	CPM921N, Corrosive and protection of metal	0	0	3	0	1	2	0	0	0	0	1	0	1	1	2	1
73	CCH921M, Colloidad chemistry	0	0	3	0	1	2	0	0	0	0	1	0	1	1	2	1
74	PTE921N, General technicals for environmental treatment	0	0	3	1	1	2	0	0	0	2	1	0	1	1	2	2

6. Course abstracts

6.1. MLP151N, Principles of marxism - Leninism (5 credits)

This course is designed to equip students with the basic knowledge about the basic principles of Marxism - Leninism including The worldview and the philosophical methodology of Marxism - Lenin; The doctrine of Marxism - Leninism on the mode of capitalist production; The theory of Marxism - Leninism on socialism; Through it, to equip students with worldview, scientific methodology; providing students with the most common understanding of worldview and methodology. This course has a direct relationship with Ho Chi Minh Thought, the revolutionary path of the Communist

Party of Vietnam, subjects of political theory, natural sciences and social sciences - humanities.

6.2. HCM121N, Ho Chí Minh's Thoughts (2 credits)

Ho Chi Minh Thought is compulsory subjects belonging to general education knowledge, the object of study is the system of theoretical views of Ho Chi Minh on the basis of Vietnam's revolution.

Specifically, this subjects provides basic knowledge about Ho Chi Minh ideology as the basis, the formation and development of Ho Chi Minh thought.

Simultaneously, this subjects provides basic thematic ideas of Ho Chi Minh as: Thoughts about the issue of ethnic and national liberation revolution; thought about socialism and the path of transition to socialism in Vietnam; thoughts about the Communist Party of Vietnam; thoughts about socialism and the path of transition to socialism in Vietnam; thoughts about the Communist Party national unity and international unity; thoughts about the state of the people, by the people, for the people; thoughts about culture, ethics and build new human.

This subject has a direct relationship with the subject The basic tenet of Marxism - Leninism, Revolutionary way of Communist Party of Vietnam and the scientific disciplines of political theory, social sciences - Humanities.

6.3. VCP131N, Principles of Vietnam communist party (3 credits)

Subject "Revolutionary way of Communist Party of Vietnam" basically research the revolutionary way made by the Party during the process of leading Vietnam's revolution from 1930 to present.

Not including the opening chapter, the subject includes 8 chapters. Chapters 1, 2 and 3 students will study the revolution way of the Party in the national, democratic and popular revolution (1930-1975); In the chapters: 4, 5, 6, 7 and 8, it researches on the revolution way of the Party in the renovation period, such as the way of industrialization; building up socialist-oriented market economy; building political system; building and developing the culture, social problem-solving and the foreign policy.

By studying this subject, students will have the basic knowledge about the establishment of the Communist Party of Vietnam, understand the process of formation, complement, development of the revolutionary way of the Party and judge results of implementation the Party's revolutionary way on some fundamental aspects of the renovation period.

6.4. EDL121N, General of law (2 credits)

This course provides basic knowledge about the state and law, such as the origin of state and law, the essence of state and law, form of state... Simultaneously, the course provides basic knowledge on some important law in the legal system of Vietnam, such as Constitutional Law, Administrative Law, Criminal Law, Civil Law...

6.5. ENG131N, English 1 (3 credits)

The English 1 course provides students basic grammar such as present simple tense, continuous present tense, simple past tense, past continuous tense, comparative tense verbs, and basic vocabulary about topics such as health, sports, transportation and experience to develop language skills at Level 2 "advanced". At the same time, this course also trains students the skills to use English in everyday communication through forms of communication such as listening and reading information in interviews on the radio, conversations, read articles on familiar topics, express opinions and interpret in everyday communication situations; write grammatically correct sentences on topics like health, sports, traffic, and adventure.

Through classroom lessons and exercises on MyELT self-study software, students can consolidate their knowledge while developing self-study and self-training skills.

6.6. ENG132N, English 2 (3 credits)

The English 2 course is the next part of English 1, prepares students vocabulary about environmental topics, life events, careers, and science - technology. Besides, this course provides for students basic grammatical phenomena, such as countable and uncountable nouns, consistent number nouns, articles, large verbs, future forms, prepositions, and present tenses, components, defining relative clauses, conditionals type 1 and type 0. The course knowledge is not only academic but also includes information and practical knowledge about places, people and event in several countries around the world.

This course continues to train the learners of English communication skills at Level 3 at intermediate level, including listening, speaking, reading and writing, placed in 4 main topics as mentioned above. At the end of this course, within the learned topics, students can talk, listen to main ideas and get information, read main ideas and read information, write short paragraphs 35-45 words.

6.7. ENG143N, English 3 (4 credits)

The English 3 course continues to complement students vocabulary on Language and learning topics; travel and vacation; History; Naturally, with grammatical topics about passive sentences in the present and the past; past perfect tense, questions for the subject and the object, the adjectives –ing and tailedd; structure used to, indirect sentences; conditional type 2, the pronouns, will, might. In addition, through this course, students continue to practice communication skills in English such as: listening

to conversations, interviews, and articles; read and understand articles on topics learned; presenting personal views, planning or interviewing and practicing intimate letter writing skills, writing a personal resume of about 100-120 words.

Together with the English course 1, 2, this course continues to develop English language skills for students to achieve English level 3 according to the 6-level Foreign Language Competency Framework of Vietnam and usable in communication operations.

6.8. GME121M, Public and educational administration (2 credits)

Subject State administrative management and management education and training has particularly important implications for training programmes bachelor pedagogy. The study subjects were the students basic knowledge of the state administration (the main character of the state administration, content, processes, tools, forms, methods of management state administrative Law officers, civil servants, law officers), state management of education and training (the nature, characteristics, principles, contents management apparatus of state for education and training paths, views of the Party and State on education and training) and the legal documents on education and training; thus, students are aware of their own responsibilities in the implementation of legal documents on education and the obligation of citizens to the country. The course has a close relationship with the general law subject, the subject of general education, the professional organizations, and management school.

6.9. GIF121N, Basic Informatics (2 credits)

Basic conceptions of information processing and of computer; exploiting Internet service for learning research and teaching; skills of using operating systems for manipulating on computer; exploiting some applicable software, typing and saving documents for official work; using excel system for science and technical tasks; using PowerPoint for creating attractive and effective presentations.

6.10. EDE121N, Environment and development (2 credits)

There are 5 chapters in the content of the Environment and Development course. The course facilitates students with basic knowledge about the environment, population, human's needs and activities to satisfy human's needs, the natural resources condition, environmental pollution condition and environmental protection policies for sustainable development. The content is mention at the global scale and in-depth analysis of the scope of Vietnam

In addition, the course provides knowledge about the relationship between humans and the environment; the consequences of population explosion; the impact of population growth on the environment; influence of modern society to the natural

environment; the current condition of the natural environment pollution; the relationship of population, social-economic development, and natural resources.

Subjects related to natural and social fields such as geography, earth science, meteorology, economics, and demographics.

6.11. VIU121N, Vietnamese in use (2 credits)

Practical Vietnamese if a subject belonging to the Common knowledge curricula, related to almost every other subject in Linguistics. This subject consists of 2 chapters, providing learners with basic knowledge of the Vietnamese language, therefore training the learner's skills in using Vietnamese. Chapter 1 concerns basic knowledge of Vietnamese, correct pronunciation, dictation, and how to correct errors in forming sentences and using vocabulary; thus the learner can develop their capacity in writing correctly, choosing the right vocabulary and forming the right sentences. Chapter 2 consists of knowledge about texts, understanding texts and how to write common texts. The range of exercises in this chapter focus on reading, understanding, summarizing, writing and correcting scientific, functionary and official texts.

6.12. VCF121N, Vietnamese Culture's Foundation (2 credits)

The course provides basic knowledge about culture and culturology, provides students the basic important and specific knowledge of Vietnamese culture. Since then, it contributes the background to study scientific philology and interdisciplinary science.

The course consists of four chapters which contend general knowledge, aimed at providing students an overview of culture and culturology in general, and mainly delve into the most fundamental issues of Vietnamese culture: positioning Vietnamese culture; Vietnam cultural process; some basic elements of culture; cultural areas in Vietnam; Vietnam culture from traditional to modern.

6.13. LOG121N, Basic Logic (2 credits)

Logic is the scientific thinking. This subject equips students with basic knowledge about the forms and laws of thinking, help students to think independently and know how to solve the problem solving concerning the exact thinking and dialectical thinking.

Logic have relations with all the other sciences because it equips approach the right mindset for learners. In particular, it is closely associated with science as philosophical reasoning; with computer science as mathematics; with the humanistic social sciences such as linguistics, psychology, etc.

6.14. CDE121N, Culture and Development (2 credits)

The course mentions specialized knowledge concerning culture and development, the characteristics of Vietnamese culture and the development of Vietnamese culture.

This course provides students some critical themes and concepts concerning culture and development in general. The course aims to help students identify cultural characteristics and the relationship between culture and development in the context of contemporary Vietnamese society.

6.15. Physical education 1, PHE111N

The Physical education 1 is a compulsory course for non-specialized sports students of Thai Nguyen University of Education. This course includes two sports: Athletics and Gymnastics. These are the two sports with the oldest history, occupying an important position in the competition programmes of the International Olympic Games and in the cultural and sports life of mankind... This course provides for students the knowledge of education and health care, hygiene, includes the basic skills contents, such as short-distance running, long-distance jumping, team formation exercises, and hand exercise is not. Moreover, this course also helps students improving their health, contributing to training the ethical qualities, wills, agile manners, collective spirit... creating favorable conditions for training in other sports.

6.16. Physical education 2, PHE112N

In the physical education module 2, students can choose to study one of the following five sports: Football, Volleyball, Basketball, Aerobic, Martial Arts. This course provides for students the benefits and effects of practicing the sport which they study, the basic technical principles, tactics, competition rules, organization, and referees. ... This course forms the basic skills and techniques in those sports, helps students improving their health, contributes to the training of moral qualities, wills, agile manners and spirit collective spirit... creating favorable conditions for training in other sports.

6.17. Physical education 3, PHE113N

In the physical education course 3, students have chosen to study one of the following five sports: Sports Dance, Handball, Shuttlecock, Badminton, Chess. This course provides for students the benefits and effects of practicing the sport which they study, the basic technical principles, tactics, competition rules, organization, and referees. ... This course forms the basic skills and techniques in those sports, helps students improving their health, contributes to the training of moral qualities, wills, agile manners and spirit collective spirit... creating favorable conditions for training in other sports.

6.18. Defense education: According to separate rule

6.19. MAT221M, Advanced mathematics for chemistry (2 credits)

This subject provides students with basic knowledge of the basics for the sets, mapping, matrix, determinant, set of equations linear, real numbers and functions of

real variables; theoretical limit; continuous function; calculus of functions of one variable; primitive and indefinite integrals, definite integrals, integral generalized

6.20. PHY241M, Physics (4 credits)

This course includes the most general and basic theoretical knowledge of matter structure, the matter properties, the existence of material phase and the phase transition process, the natural forms of movement, from the motion of the atoms, charges to the motion of the planets, orb, four forms of interaction and forces in nature, the general knowledge about astronomy, space science and applications for common astronomical phenomena. The course content also includes basic knowledge about the current in different environments such as: solid, liquid, gas; natural phenomena and applications such as electrical discharges in gases (lighting), electrolysis phenomena and its applications in molding, electroplating, painting, the knowledge about using electricity safety, economical and efficient.

6.21. BIO241M, Biology (4 credits)

This subject provides basic knowledge about the origin of life, the emergence of life on Earth, the distribution system biota; structure and function of cells, cell cycle, general introduction to the process and energy metabolism in cells, the growth and reproduction of cells, the process of sexual reproduction of the cell; the basic knowledge of the genetic phenomena; Introduction classical and modern evolution. In addition, this subject also provides an overview of the contents of the flora and fauna including the plant body composition, the process of acquisition and exchange of substances in the plant body; structure and operations of the agencies in the bodies of animals and humans. The module also provides basic content of ecology, the biosphere, the relationship and the interaction between gender inorganic and organic in nature world, the role of humans in such activities. From that show the essence, the impact and effects of climate change on the lives of humans and other species in the world to have a sense born to preserve and protect nature.

6.22. ECB221N, Ecology and biodiversity (2 credits)

Ecology and biodiversity as a compulsory subject in the curriculum, the course of the biological basis. The course provides students with the concepts of ecology, environmental and ecological factors. Impact of ecological factors on living organisms and the adaptation of organisms. Populations and relationships between individuals in a population, the characteristics of the population. Communities and interspecific relationships in communities, the nature of communities, ecological succession. Ecology and material flow, energy flow in ecosystems. The concept of biodiversity, the value of biodiversity, degradation of biodiversity, conservation of biodiversity and biodiversity in Vietnam. Subject ecology and biodiversity primarily related to the

study of biology as Botany, zoology, physiology, genetics ... Then with relevant subjects relating to the environment as climate, soil study, hydrographic, geography, chemistry, physics ... So half of ecology and biodiversity are multidisciplinary and interdisciplinary, shown bold diversity and complexity of it, affects learning and acquiring knowledge of student discipline.

6.23. AST221N, General astronomy (2 credits)

Astronomy studies the motions of celestial bodies in the relationship between the earth and sky. It provides students with the nature and evolution of matter in the Universe. The course also helps students Pedagogy teaching better the knowledge related in natural science programme at high schools. For well finish the course, students need to be equipped with the knowledge of mechanics, optics, nuclear atomic physics.

6.24. GBI221N, Earth Science (2 credits)

Earth science subjects including basic knowledge of the rules arises, the development of the natural world, the natural phenomena in the universe, the solar system and the Earth, Geological-topogrphic, Climate and weather, Hyrosphere, soilsphere, this is fundamental knowledge to help students can explain the scientific basis of natural phenomena occur frequently around us. Especially the knowledge of the nature reflects the relationship of the components constitute the geographic shell, in which living things, the relationship between organisms with climate and soil, so on explain the basis of form factors of the regional climate on Earth. They can be explained the distribution of vegetation on Earth follow the rules of distribution of climate and soil. Also can explain the evolution of organisms based on the change of the environment through the stages of Earth's history from the ancient age to nowaday

6.25. CMS341M, Chemistry of material structure (4 credits)

Chemistry of material structure is the base course in specialty knowledge, which supplies to the students with the base knowledge. Therefore the students are able to study other courses, such as inorganic chemistry, organic chemistry, analytical chemistry, physical chemistry…Chemistry of material structure is a part of the most basic knowledge of substance structure. This course uses the most basic knowledge of advanced mathematics to study the atomic structures, periodic table of chemical elements, molecular structures, the chemical bonds in substances and in the crystal status of materials.

6.26. TCP331N, Fundamental theory of chemistry process (3 credits)

Fundamental theory of chemistry process is base course in specialty knowledge, which supplies to the students with base knowledge. Therefore the students are able to study other courses, such as: inorganic chemistry, organic chemistry, analytical chemistry, physical chemistry…

Fundamental theory of chemistry process is a part of the most basic knowledge of theoretical basis of chemical processes and conditions leading to the chemical processes to occur. This course uses the most basic knowledge of advanced mathematics and general physics to study various conditions such as temperatures, pressures, entropy, and thermodynamic quantities of reaction occurring within, any system, the balance system, solutions and electric-chemical system. Thus, skills on applying knowledge into solving matters in teaching, science, and life.

6.27. PBC321N, Practical basic chemistry (2 credits)

Practical Chemistry is a discipline of the fundamental knowledge base. This subject is equipped with basic knowledge and skills so that students are able to perform well experiments on basic chemistry high school. At the same time, students can confidently participate in scientific research, the implementation of extracurricular content, inter-subject experience.

6.28. CNE341N, Chemistry of non-metallic elements (3 credits)

The "Chemistry of Non-metallic Elements" module provides basic and up-to-date scientific knowledge of non-metallic elements and their compounds. The basic contents of the course include location, structural characteristics, properties, natural state, methods of preparation and applications of nonmetals and their compounds.

6.29. CNE331N, Chemistry of metallic elements (4 credits)

The "Chemistry of metal elements" course provides basic and up-to-date scientific knowledge of metal elements and their compounds. The basic contents of the course include location, structural characteristics, properties, natural state, methods of preparation and applications of metals and their compounds.

6.30. PIC321N, Practice inorganic chemistry (2 credits)

The course "Practicing Inorganic Chemistry" provides basic knowledge and practical skills for students to well perform experiments on inorganic chemistry content in high schools. At once, the course helps students confidently participate in scientific research, the implementation of extracurricular content, inter-subject experience.

6.31. THC331N, Thermodynamic chemistry (3 credits)

Chemical thermodynamics is the most important part of physical chemistry. It applies and develops the principles, the laws of thermodynamics to chemical processes and physical chemistry, equip students with necessary information:

- Basic knowledge about thermodynamics
- Heating effect of chemical processes and physical chemistry
- Properties and the basic rules of solutions and their application in practice.
- Balanced conditions and processes of chemical reactions, the factors affecting the balance.

6.32. KCH321M, Kinetic chemistry (2 credits)

This course will help students better understand the knowledge related to the rate of reaction, the reaction rate constants, what have been mentioned as part of the fundamental theory of chemistry process. This course provides students with the knowledge of reaction rate, the reaction rate constant, kinetic rule of simple and complex reaction, the number of factors affecting the reaction rate as the concentration of reaction substance, temperature, catalyst concentration; reaction mechanism; Basics of catalytic phenomena, catalytic reaction classification, the influence of catalyst to rate of reaction.

6.33. ELE331N, Electrochemical and physicochemical experiment (3 credits)

In this subject, the rule of interchange between the chemical potential and electrical power is studied that provides for students the basic knowledge about:

- The theory of dissociation solution.
- The equilibrium between the electrode and the solution.
- The irreversible electrochemical processes. The application of some electrochemical reactions in life and production.

The physico-chemistry experiment introduces to students how to carry out the experiment via the basic knowledge that gained in subjects of physico-chemistry. From that, students improve and enhance their knowledges that they achived before

6.34. TOC321N, Theoretical principle of organic chemistry (2 credits)

Theoretical Principle Of Organic Chemistry is the fundamental knowledge of organic chemistry, including research methods of organic chemistry, chemical bonding in organic molecules, hybridization, isomerism, nomenclature, configuration, stereochemistry, electron effects, spatial effects, organic reactions and mechanisms of organic reactions.

6.35. HDC321N, Hydrocarbon (2 credits)

Hydrocarbon of material structure is a part of the most basic scientific knowledge of composition, molecular structure, chemical bonding, chemical properties, applications and methods for the preparation of hydrocarbon compounds. (saturated hydrocarbons, unsaturated hydrocarbons, and aromatic hydrocarbons). Therefore, skills on applying knowledge into solving matters in teaching science and life.

6.36. DHE331N, Derivatives of hydrocarbon excess (3 credits)

Hydrocarbon derivatives is considered as an important part of basic scientific knowledge, contemporary, always tie to real life production and teaching in high school. This course provides the knowledge of the structure, chemical properties, applications and preparation of hydrocarbon derivatives compounds. Addition, it may be forming for students the skills to solve the problems in science and life.

6.37. CCH321N, Complex organic molecular and polymer (2 credits)

Complex compounds and polymers function as part of basic scientific knowledge, contemporary, always tied to real life production. This course provides the knowledge of the structure, chemical properties, applications and preparation of nitrogen-containing compounds, complex compounds and high molecular function. Thus forming the skills students use knowledge to solve the problem, the problem in science and in life.

6.38. POC321N, Practical organic chemistry (2 credits)

Practical Organic chemistry is one of important subjects of the training programme. This course provides the learner the experimental results to demonstrate the learned organic chemistry knowledges. Forming for learners the ability to use equipment, laboratory tools, safety skills when working with harmful organic substances.

6.39. TAC321N, Basis theory analytical chemistry (2 credits)

This course gives learner the understanding of basic theory of analytical chemistry, helps learner to understand clearly, configure equilibriums, processes that happen in solution, the factors that influence those processes, how to predict and explain phenomena occurring in electrolyte solution based on qualitative, semi-quantitative and quantitative assessments, etc. The equilibrium calculation is deployed by using approximately continuous method and ignores ionic force effect.

6.40. QAC331N, Quantitative analytical chemistry (3 credits)

This course aims to provide students the basic knowledge of the quantitative analysis methods which are commonly used in chemistry and related fields. After completing this course, the students are able to apply a suitable quantitative analytical methods for determining the concentration of one element, one substance in an any sample.

6.41. ACE321N, Analytical chemistry experiment (2 credits)

The Practical analytics chemistry is one of the subjects of specialized knowledge. This course helps learners apply the theory of ionic equilibrium in solutions in order to explain, understand the properties of inorganic substances in the solution, predict the ability of reactions, strengthen the studied theory.... The subject also equips for learners the qualitative and quantitative determination of substances by conventional and modern analytical methods. Besides, the course also helps students confidently participate in scientific research, implementing extracurricular content, interdisciplinary experience. Moreover, learners can fully identify and quantify substances in different analytical samples in various fields such as industry, agriculture, medicine, pharmacy after graduation.

6.42. CFL321N, Chemistry for life 1 (2 credits)

Chemistry for life one is a subject providing for students knowledge about chemical products which relation with everyday life. It will prepare a lots knowledges about processing of production, application, the environmental problem in production, impacts to environment and health of human. The knowledge in this subject relate interconnection with inorganic, organic, environmental subjects. Preparing for students about these sciences will help them connecting and using these sciences for their life, as well as for their teaching.

6.43. CFL322N, Chemistry for life 2 (2 credits)

The chemistry for life two will provide for student about fertilizer, chemicals for protection plant (for example, pesticides, herbicides...), safe for food and polluted environment in agriculture. Generally, student will understand the disadvantage effects to environment and proposing solutions to solve polluted effects. Safe for food has been a necessary problem. We must have solutions to enhance consciousness, responsibility of manufacturer, as well as consumers, rising quality life for human.

6.44. CCC321N, Chemistry of coordination compounds (2 credits)

This course presents basic knowledge about the complex, component, structure, isomerism and nomenclature. This course uses 3 modern theories (Valence bond theory, Crystal field theory, Molecular orbital theory) to explain chemical bond in the complex and the characteristic properties of the complexes. Furthermore, this course presents characteristic reactions of complex. Thus, the students have skills on applying knowledge about complex into solving matters of science, teaching process and life.

6.45. SUC321N, Application spectrometry method on chemistry (2 credits)

This course provides students with the following knowledge: Theoretical basis for formation of infrared spectra (IR), visible ultraviolet (UV-Vis), mass spectrometry

(MS). Some characteristics, principles of spectroscopy and application of infrared spectra, visible ultraviolet, mass

6.46. ECS321N, Statistical data handling of experimental chemistry (2 credits)

The course provides the concepts of mathematical statistics and empirical data processing such as: deviations (bias),random variable, precision; repeatibility; variance, standard deviation; some common distributions; reliable boundary (ε) and reliable accuracy;...

Statistical processing of data obtained in experimental chemistry: calculate the quantities that characterize the concentration and dispersion of the dataset; the error in indirect measurements; Use the standard t, Q to check the system error of the dataset and the crude error of a certain value; Compare variance and compare the mean of two or more measurements; Use standard F to compare repeatability of two test series; test a statistical hypothesis; To define meaningful digits, the rules for rounding numbers and show data in chemistry.

6.47. CHM321N, Material chemistry (2 credits)

This subject provides the most basic knowledge about materials, such as concepts, classification, structure, types of bonding in materials, properties of materials. In addition, some common materials such as ceramics, composite materials, inorganic polymer materials, and advanced materials (nanomaterials) have also been mentioned. In each type of material, specific properties are studied and hence outline their main uses. Moreover, students can develop skills in applying knowledge in materials chemistry to solve problems in science and in life.

6.48. SOC321N, Synthesis organic chemistry (2 credits)

Provides students some basic knowledge of organic synthesis and synthetic methods for producing organic compounds

Chapter 1: The attachment functional groups onto organic compound molecules and the transformation between functional groups.

Chapter 2: Methods of carbon – carbon combination creation in organic compounds.

Chapter 3: Methods of carbon – hetero-atom creation

Chapter 4: Methods of cyclization in organic chemistry.

Chapter 5: Synthesis of organic compounds based on reduction reaction.

Chapter 6: Synthesis of organic compounds based on oxidization reaction.

6.49. QCH321M, Quantum chemistry (2 credits)

Quantum chemistry is the subject matter of the specialized knowledge block. This subject is equipped with in-depth knowledge so that students can understand the basic knowledge gained in the chemistry of material structure.

This subject introduces the fundamental knowledge of quantum mechanics applied for chemistry; some fundamental concepts of quantum mechanics such as wave function, complex number, operator, function of private, private values; the basic axioms of quantum mechanics and the important consequences of the axioms of quantum mechanics. This course also helps students with the knowledge to explain the structure of hydrogen atom and the same hydrogen generation by quantum mechanics; many electron atoms. Basically, it provides the knowledge of VB, MO, HMO methods in the research of structure of chemical compounds.

6.50. EPS331M, Educational psychology (3 credits)

The subject gives students the concepts, rules and common methods of educational psychology; the theoretical issues of the psychological development of high school and junior high school students; mechanisms, rules and psychological development stage individuals; the psychological basis of teaching activities and education; relationships between learning and perception, learning and education, psychological theories and models of learning; psychological basis of moral education. Special courses also give students some theoretical issues about the ethical and psychological support skills in basic schools. From there, it is possible to apply the knowledge learned in teaching, research and human psychology, formation and personality development of students, school support, higher solving difficulties in psychology. At the same time, the subject is also the basis for studying other subjects in the curriculum, such as school education and psychology major so their applications.

6.51. PEP341M, Pedagogics (4 credits)

Pedagogics is the compulsory subject in the general education of Bachelor pedagogy training curriculum. This subject give basic knowledge for students learner to build their political opinion, their professional moral, teaching ability, educated ability in working with student in school.

This subject is about:

- Knowledge of Education is a science of human education science; Factors that affecting personality development; The aim’s education system and the education mission.
- Knowledge of teaching theory: the definition of teaching process, the factors that contribute the teaching process; the ruler, methods, and form of teaching.
- Knowledge of education theory: definition of education process, the process of education essence, the logical in processing of education; Education rules and education methods of organizing education activities in school.
- Knowledge of teacher’s character, some contents and special methods that teacher using to educate pupil.

6.52. TTC441N, Theory of teaching chemistry (4 credits)

Subject Theory of Teaching Chemistryin High School content is the general problem, issues about the nature theory of teaching high school chemistry. Course content consists:

- Theory taught chemistry in high school (The rationale of the process of teaching high school chemistry), including teaching duties, content and curriculum structure, methods and forms of the organization teaching chemistry in high school.

- Research on the process of teaching high school chemistry, include basic concepts, the scientific method (in general) and scientific research and education on teaching chemistry (in particular).

After completing the course, outside the system of basic knowledge, module also helps students skill eduse knowledge of psychology and education in teaching chemistry, on scientific research for teaching chemical process in high school, in itially for medare the qualities required off uture chemistry teachers.

6.53. TMC431N, Chemical teaching methods in high school (3 credits)

Methods of teaching high school chemistry is a compulsory subject in the curriculum of pedagogical chemical industry.

This course provides students:

- The system of chemical knowledge content in the programme studied chemistry in high school, the structure of the teaching plans and development-oriented programmes in chemistry in high school.

- Scientific basis of the selection, selection skills, ability to apply the teaching methods, means, and forms of organization for the type of teaching the lesson content in high school chemistry.

- Skills content analysis chemistry lessons, designing lessons and planned teaching methods for each type of lesson, identify the requirements of the study to achieve.

- Knowledge of the specific teaching methods in teaching chemistry, ability to deploy the type of chemistry lessons: Lessons on the theory of chemistry, chemical laws, lessons about the elements and the chemicals (inorganic and organic), review lessons, training, ...

6.54. ECT421N, Chemical experiments in high school (2 credits)

The course content includes chemistry in high school, the experiments performed by teachers and practical experiments the students. Complete the course, students should be proficient in pedagogical skills in using teaching experiments in high school chemistry, including the following tasks:

Proficient in preparation for a lesson in the student's practice.Technical proficiency and conduct the experiments performed in the programme.

Select the content and methods for performing experiments of teachers, students do experiments to learn last match of learning content.

6.55. ESC421M, Chemical exercises in high school (2 credits)

This course consists of 2 credits which include the presentation of theory is the classification, forms and types of exercises from the main chemical in popular programmes, analyze the role of chemistry homework tasks in teaching chemistry in high school. Practical part consists of including exercises, discussion helps students locate exercises in chemistry education curriculum, the students and guide the types of exercises, using exercises in specific types of lessons, improve computational chemistry and chemical use language content for students.

The course is organized into 6 chapters; with the following content:

Chapter 1: Some common problems about high school chemistry; Chapter 2: General methods to solve a chemical problem; Chapter 3: Generalized exercises

Chapter 4: Inorganic chemistry exercises; Chapter 5: Organic chemistry exercises

Chapter 6: Using exercises in the process of teaching chemistry

6.56. PTT421N, Pedagogical training in teaching chemistry 1 (2 credits)

Pedagogical Practices courses Chemistry 1 is subject to help students practice teaching skills such as: Presentation skills; panel presentation skills and organizational skills of collective activities (classes, team, …). Through the course, students are initially formed the basic teaching capacity, especially the ability to use language, the language of chemical, initially have some understanding of the work of teachers

understanding of the capacity of the teachers, but those powers needed to meet the requirements of general education innovation

6.57. PTT422N, Pedagogical training in teaching chemistry 2 (2 credits)

This course includes 2 credits (2units of study), course content is the process of practice teaching skills, those skill necessary for the chemistry teacher in high school. After completing the course, students will have mastered the learning skills to prepare, skills to conduct lessons in teaching high school chemistry, that applying the general knowledge of psychology, education on the deployment of teaching, know to apply theoretical knowledge in practice teaching, are trained to master the practical skills of teaching chemistry in high school.

6.58. TRA421N, Pedagogical practice 1

Contents of Pedagogical Practice 1 subject to help learners understand educational reality, interact with students and teachers of internships, thereby forming professional feelings, promoting self-training according to the requirements of the profession; understands the content of the professional work of the subject teachers, has initial skills in-class assignment.

6.59. TRA432N, Pedagogical practice 2

The content of the subject Pedagogical Practice 2 aims to help learners improve the skills of class organizations, educational activity, improve the emotional, professional ethics; have basic skills in lesson preparation, class promotion; organize lectures; assess students' learning outcomes; can be independent in class to lecture and be a class direction.

6.60. IAT421N, Informatic application in chemistry teaching (2 credits)

The subject "Applied Informatics in Chemistry Teaching" helps enhance student's imaginableness and creativeness in order to improve the effectiveness in teaching Chemistry. The subject studies how to integrate the applications of information and communications technology (ICT) into the teaching methods of Chemistry; examines the teaching and learning Chemistry in ICT environment so that it can enable student's activeness and self-studying in Chemistry. The subject provides students with necessary skills in ICT, which partly contributes to the national education reforms nowadays. "Applied Informatics in Chemistry Teaching" also provides students with important knowledge in order to utilize other software in teaching and learning Chemistry. It is even helpful for further integrated and relevant subjects.

6.61. TOE421M, Teaching in the online environment (2 credits)

The course equips students with theoretical knowledge about the environment and popular supporting tools for online teaching nowadays. Students also have chance to learn about the skills to design, organize, and manage online courses of their department. Students will apply teaching methodology into designing online courses on Moodle - a new Learning Management System (LMS), which focuses on improving their Information technology (IT) skills, enhancing active interaction with learners in the online learning environment.

6.62. HOC421N, History of chemistry (2 credits)

This course consists of two parts:

- The theory presents the main characteristics of the stages of development of chemical science in the formation and development of the society, including the formation and development of the theory of study, the typical achievements of each period, the typical scientist, the science of chemistry in each stage.

- The practice of discussing will analyze the role and significance of the research on the history of chemistry, the basic content of the historical materials chemistry can be used in teaching and methods of construction and use of the manual hand history of chemistry materials, lesson planning for some chemistry lessons using historical materials chemistry.

6.63. TDC421M, Differentiated teaching in chemistry teaching at high school (2 credits)

This subject covers some of the most important contents on the concepts, methods of organizing differentiated teaching (DT) in teaching Chemistry. Because of specific properties, DT has its own principles in which the most remarkable idea of teaching is that teachers must consider students as distinguished individuals; to value quality above quantity; focus on learners – learning would be relevant and interesting; utilize whole-class teaching methods

6.64. ETC421M, Equipment teaching chemistry (2 credits)

Teaching facilities are material objects to be used by teachers as a means of organization, control cognitive activities of learners to achieve learning objectives. Contents of this module consists of two parts: The theory includes a basic knowledge of general teaching facilities, teaching the traditional media, the means to teach Chemistry, multimedia in teaching and application of multimedia in teaching high school chemistry. The practical help students use the general teaching facilities and teaching facilities for the teaching of chemistry in particular.

6.65. PMC421M, Problem-solving method in chemical teaching in high school (2 credits)

Problem-solving method in teaching, also called problem-based learning is a learner-centered teaching method, a typical model of capacity-oriented development in schools, in which students learn about topics through the issues mentioned in documents or in practice, relating to course content. Working in groups helps students identify what they have known, what to learn, and how to obtain the necessary information to solve the problem.

Problem-based learning focuses on practical issues related to learners and the course content, which has been defined in the standards of knowledge and skills. On that basis, learners obtain and develop such capacity as planning, self-directed learning, collaboration, and higher-order thinking skills (HOTS), life skills, etc.

6.66. NSC421N, Natural scientific topics of chemistry in high school (2 credits)

Natural science subjects in general schools are subjects of the elective subjects. The integrated interdisciplinary topics should be built in order that the contents are practical, interesting, and attractive to students. They must inspire interest and motivation of learning for students. Studying those topics will help to improve students' capacity of applying general knowledge on solving practical situations, and lessen the mechanical way of memorizing knowledge. Students' capacity and quality, therefore, will be formed and promoted. This course equips students with the knowledge of Chemistry related to practical issues, reflecting the deep

interdisciplinary relationships with other subjects, and becoming the basis for designing interdisciplinary themes to ensure the requirements of integrated teaching in Chemistry at high schools. The contents of the course including such issues as *The state of substance, Acids and bases, metals, Inorganic carbon, Energy, Atmospheric Chemistry, Ocean, Organic synthesis technologies, etc.* will help students mount the Chemical knowledge to practical life, develop problem-solving ability and creativity to students, etc., and help students relate Chemical knowledge with practical life, improving the capacity of problem-solving and creativeness for students.

6.67. UEC421M, Using English in chemical teaching (2 credits)

This module is aimed at improving professional competence for students; utilizing knowledge and skills in English for their professional duties as a teacher of Chemistry. The contents include reading passages about universal scientific knowledge, common Chemical knowledge from specialized English documents; how to access the requirements of IGCSE certification exam. The contents are compiled to suit the knowledge of Chemistry as well as other natural sciences at secondary school, including the following topics: - Science, - the elements and chemicals (Periodic Table of chemical elements), - foreign educational programmes, etc. with some organizational models for specific teaching activities.

6.68. Thesis graduation

6.69. TPD931N, Chemical teaching in schools under the positive direction (3 credits)

The course content consists of two parts:

Overview of the most common definition of innovation-oriented teaching methods (general) and methods of teaching chemistry in high school (in particular), which focus point of research on teaching: "Teaching a learner-centered" orientation is the implementation of active teaching.

After completing the course, in addition to basic knowledge about active teaching, course provides students with basic skills to develop a positive chemistry lesson, that the teaching methods used learn basic techniques taught, teaching techniques, test evaluation in a positive way to improve the efficiency of the process of teaching high school chemistry.

6.70. TAT931N, Measurement and assessment in chemical teaching (3 credits)

The basic contents of the module include General issues of testing and evaluating learning outcomes; Teaching objectives; Methods and forms of assessment; Assessment tools, Procedure of organizing an examination, etc. These contents will equip students with the methods and techniques in evaluating, designing questions, building test types, how to organize an exam, how to collect and process the data

obtained after each exam evaluating the learning outcomes of Chemistry in schools in order to meet the requirements of the new education reform programmes. Addition, the module provides a number of techniques dealing with exam questions in order to generate the best ones.

6.71. CCN921N, Natural compound (2 credits)

Natural products is an important part of organic chemistry. Provides graduates a systematic advanced knowledge base and methods for studying of natural products such as extraction method, physicochemical properties, identification of structural methods, biological activities, its applications of natural compounds in plants, animals and micro-organisms, which exhibit biological effects as terpene, terpenoid, steroid, alkaloid, and polyphenol.

6.72. CPM921N, Corrosive and protection of metal (2 credits)

This course help the student to know how to solve the problem of metal corrosion or encounter in real life. The course provides students with the knowledge of metal corrosion, the economic importance of the problem of metal corrosion. Mechanism of electrochemical corrosion measures against corrosion of metals and ways of determining the rate of metal corrosion

6.73. CCH921M, Colloidad chemistry (2 credits)

This course will introduce students with basic knowledge about the highly distributed system, the role, and importance of this system in production and life, in biology and materials technology. Composition and method of preparation and purification of glue. Surface phenomena, adsorption of the colloidal. Some optical properties, kinetic properties, electrical properties, the phenomenon of flocculation of colloidal systems. About a distributed system, the sale colloidal.

6.74. PTE921N, General technicals for environmental treatment (2 credits)

General technicals for environmental treatment will provide knowledges about analysis, evaluation impacts of polluted environment since students use these knowledges to propose treatment solution for polluted environment. Particularly, they will be provided systematically contents relating to general technicals to treat the polluted soil, water, air. These knowledges will extremely advantage to apply them to our life, teaching, introducing students to studying the science in the high schools.

VICE RECTOR

Mai Xuan Truong

DEAN

FACULTY OF CHEMISTRY

Nguyen Thi Hien Lan