

**THE UNIVERSITY OF DANANG
UNIVERSITY OF EDUCATION
FACULTY OF PHYSICS**



**PROGRAM SPECIFICATION OF
PHYSICS TEACHER EDUCATION**

CODE: 52140211

Danang, 2017

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PART 1. DESCRIPTION OF PHYSICS TEACHER EDUCATION PROGRAM

1.1. Brief Introduction

Physics teacher education program (PTEP) was designed and first applied in 2000 as an academic year training program. It consists of 210 learning units within 04 academic years, of which 01 learning unit is equivalent to 15 hours at class (time for one hour is 45 minutes).

In 2006, according to the requirement of higher education innovation of the Ministry of Education and Training (MOET), PTEP was transformed from academic year training to credit-based training system. Consequently, the teaching volume changed from 210 learning units to 120 credits. 01 credit is equivalent to 15 hours at class and 30 self-study hours. The time for one hour increases to 50 minutes.

However, the feedback of lecturers and students revealed that the number of credits was not enough to organize all teaching and learning activities as planned and required by the PTEP. Therefore, in 2010, the University of Danang - University of Science and Education (UD-UED) Council decided to increase the number of credits from 120 to 135. Simultaneously, several selective courses were added to the PTEP to ensure that the ratio of compulsory credits to selective credits was 110 to 25.

In 2013, the PTEP was revised again. The content of general courses were redesigned in the direction of interconnection between the training branches. Furthermore, English-skill requirement for graduation, which is B1 level in Common European Framework of Reference for Languages (CEFR), was applied to students. In other words, in order to graduate from the PTEP, students enrolled from 2013 must accumulated enough 135 credits and have B1-level English certificate.

Further improvement of PTEP was done in 2015. The number of credits was kept at 135, but there were some adjustments in the program expected learning outcomes (PLOs) and the ratio of knowledge clusters. In details, the PLOs were adjusted in a measurable direction. The courses' content and methods of teaching and assessment were also updated and improved to help students meet published PLOs. In addition, the total credits for the practical and professional courses were increased, and the courses which did not contribute much to PLOs were removed. Also in 2015, a satellite school model of internship was first applied with a practice time of up to 20 weeks, which was twice longer time and held earlier than the previous model. On the

basis of the demand from the labor market, information technology skill (IT-skill) requirement for graduation was applied for students enrolled from 2014 as well.

After two years of application, the satellite school model of internship received positive reviews from both students and teachers (employers) at high schools. However, this model had two issues that need to be addressed. Firstly, since the practice time at the satellite schools was long, the remained courses at the UED were overloaded for students. Secondly, the students were not adequately equipped with the knowledge and skills for practice at satellite schools because internship was held one semester earlier compared to the curriculum schedule.

Therefore, in the most recent revision, the PTEP was rearranged so that the professional courses were learned earlier. The total credits at the 6th and 7th semesters were also reduced to 15 and 10, respectively. Moreover, a course of "Introduction to Physics Teacher Education" was added to the PTEP at the 2nd semester to help students access the professional knowledge. Faculty of Physics (FP) is planning to improve the PTEP towards the conceive-design-implement-operate (CDIO) standards.

1.2. General Information

Program title	Physics Teacher Education
Code	52140211
Level	Undergraduate
Type of training	Fulltime
Training duration	4 years
Type of diploma	Bachelor of Physics Teacher
Language used	Vietnamese
Awarding body/institute	UD-UED
Program Accreditation	Physics Teacher Education
Website	http://vatly.ued.udn.vn
Last updated	01/06/2017

1.3. Educational Philosophy

Educational Philosophy of the UED was published in Decision No. 321/QD-DHSP dated on March 10th 2015 by the UED's Rector, that is "***Comprehensiveness, Liberation, Creativity, Practicality***".

- **Comprehensiveness:** The training outputs shall include Morality – Intellect – Physicality – Aesthetics, meeting the requirements of national development and international integration.
- **Liberation:** The education aims to provide learners with a wide range of knowledge and the skills needed to have profound expertise in a certain field as well as acquire and apply the knowledge to a variety of areas.
- **Creativity:** Creativity is a characteristic of human beings and a necessary requirement for scientists. Formation of creative and independent thinking is the basis for innovations and inventions in the teaching and research processes of a teacher.
- **Practicality:** Practicality plays an important role in training. Theory should be associated with practice. The knowledge learned from the university must be flexibly applied to the working process after graduation.

1.4. Vision and Mission

1.4.1. Vision and Mission of UED

- **Vision:** By 2030, UED will become an autonomous center of education which is capable of training and researching in a series of cutting-edge fields that meet international quality standards, and a prestigious university classified at high level in Southeast Asia and all over the world.
- **Mission:** UED has the mission of training and fostering high-quality human resources; developing scientific research, technology transfers in the fields of education, natural sciences and technology, social sciences and humanities; serving the community with commitment to guarantee the quality of education and international integration.

1.4.2. Vision and Mission of FP

- **Vision:** By 2030, Faculty of Physics of The University of Danang - University of Science and Education will become one of the leading Physics faculties in Vietnam as well as Southeast Asia.
- **Mission:** FP carries out undergraduate and postgraduate education in physics and fosters teachers to serve the socio-economic development of Vietnam, especially the Central Region and Highlands.

1.5. Program Objectives (POs) of PTEP

- **PO1.** Teaching subjects related to Physics, at secondary and high schools levels.
- **PO2.** Life-long learning and continuing to study at postgraduate levels.
- **PO3.** Working in fields related to Physics in colleges, universities, research centers, and companies.

1.6. Job and Post-graduate Study Opportunities

Students graduated from the PTEP are able to:

- teach subjects related to Physics at high and secondary schools,
- work as an expert in education management agencies (departments, offices, educational centers, etc.),
- work in education companies (books and school equipment companies, cultural education centers, etc.),
- create employment related to education and Physics (establishing online learning classes, private teacher, etc.),
- work as teaching assistant, lab partner or assistant in colleges, universities and research centers,
- participate in research projects related to education and Physics,
- continue to study at postgraduate levels related to Physics and education,
- work at companies that have departments related to the field of Physics.

1.7. Admission Criteria, Training Organization, and Graduation Conditions

1.7.1. Admission Criteria

Enrollment and admission requirements are followed the guidelines of MOET and the regulations of UD-UED, which are posted in details on the website <http://tuyensinh.ued.udn.vn/>.

1.7.2. Training Organization and Graduation Conditions

PTEP is organized as a credit-based training program, of which the training organization and graduation conditions are followed the “Full-time university and college training under the credit-based training system” regulation of MOET (Decision No. 17/VBHN-BGDDT dated on May 15th 2014). This regulation is published on the website of <http://daotao.ued.udn.vn/quy-che-43-cua-bo-giao-duc-va-dao-tao-kem-theo-thong-tu-572012tt-bgddt-sua-doi-bo-sung/>.

Additional regulations of UD-UED include:

- The PTEP is organized for 04 academic years. Each academic year consists of 02 semesters, in which each semester has at least 15 learning weeks and 03 examination weeks. In addition to 02 main semesters per academic year, there is 01 extra semester for students who want to study ahead of schedule, re-study, or improve scores. Each extra semester has at least 05 learning weeks and 01 examination week.
- For fulltime training students, in order to be recognized as graduates, the students must meet the IT-skill requirement of the UED. This requirement is stipulated in Decision No. 543/QĐ-ĐT dated on November 11th 2014 by UED's Rector and published on the website of <http://daotao.ued.udn.vn/?p=262>.
- For students studying English as a foreign language, in order to be recognized as graduates, the students must have English certificates equivalent to B1 level in CEFR. This requirement, which is stipulated in Decision No.15/QĐ-ĐT dated on January 8th 2014 by UED's Rector, together with the reference table converting the scores of international English certificates to B1 level in CEFR were published on the websites of <http://daotao.ued.udn.vn/?p=119> and <http://daotao.ued.udn.vn/?p=414>, respectively.
- The minimum number of accumulated credits per student is 135, in which 120 credits are from compulsory courses.

PART 2. PROGRAM EXPECTED LEARNING OUTCOMES

2.1. Program Expected Learning Outcomes

Students graduated from the PTEP are expected to fulfill the following learning outcomes:

1. apply knowledge of Mathematics and Physics to professional work,
2. design and implement physics experiments,
3. apply teaching theory to teaching at high school,
4. organize activities of teaching Physics and Natural Science,
5. organize educational activities and manage students at high school,
6. use IT applications in study and work,
7. communicate effectively,
8. work in teams efficiently,
9. engage in lifelong learning,
10. be aware of professional ethics and national development orientation.

2.2. Mapping Table of Program Objectives and Expected Learning Outcomes

POs	PLOs									
	1	2	3	4	5	6	7	8	9	10
PO1	x	x	x	x	x	x	x	x	x	x
PO2	x	x				x	x	x	x	x
PO3	x	x				x	x	x	x	x

2.3. Teaching-Learning and Assessment Strategies

2.3.1. Teaching-Learning Strategies

PTEP's teaching-learning and assessment strategies designed and organized constructively and synchronously to achieve the PLOs and align with UED educational philosophy include "Promoting the initiative and activeness of learners", "Promoting self-reliance, self-study of learners" and "Enhancing practice, practicality". Teaching-learning methods, delivery modes and assessment methods associated with each strategy are geared towards each specific PLO (*see the table on the next page*).

Educational philosophy	Teaching-learning strategy (TLS)	Teaching method & Delivery mode	Organization of learning activities	Assessment methods	PLOs
Liberation Creativity	TLS1: Promoting the initiative and activeness of learners	1.1. Lecture – Questioning Lecturers use verbal instructions to transfer knowledge while students take notes. Text and related visuals facilitate students’ comprehension of the lecture.	<ul style="list-style-type: none"> - Introduce a topic - Present the topic - Question, discuss, - Review and conclude (highlight, summarize, assess, etc.) 	Homework Test	1,3
		1.2. Problem-based learning Complex real-world problems are used as the vehicle to promote student learning of concepts and principles	<ul style="list-style-type: none"> - Introduce/create a problem - Help students identify the problem (ask questions) - Guide students to deal with the problem (Indicate plans or options, identify key resources) 	Report Essay Presentation Rubric Test	1,3,7
		1.3. Group discussion Participants in groups present multiple points of view, respond to the ideas of others, and reflect on their own ideas in an effort to build their knowledge, understanding, solving problem or interpretation of the matter at hand	<ul style="list-style-type: none"> - Divide into groups - Assign tasks/introduce discussion topics - Provide guidelines for each group - Supervise group work 	Presentation Study cards Rubric	1,3,7,8
		1.4. Mind map Mind map is a technique of drawing concept or topic maps by seeking links between concepts/topics or expanding them	Used in the step of <ul style="list-style-type: none"> - reviewing topics of Lecture method, - planning a project of Project-based learning method 	Concept map Rubric (teamwork)	7,9

		<p>1.5. Jigsaw</p> <ul style="list-style-type: none"> - Jigsaw is a team-work mode of activity in which all students learn all aspects of the topic, but each student develops strong expertise in one aspect of the topic. - This mode is used in theoretical teaching hours in which lessons can be divided into independent knowledge units 	<ul style="list-style-type: none"> - Divide into expert groups and compose Jigsaw groups (including at least one member from each expert group) - Assign tasks for expert groups - Expert groups conduct tasks - Each member share their area of expertise with the rest of the Jigsaw group - Recombine into expert groups - Present in front of the class 	<p>Rubric Study card Presentation</p>	<p>7,8,9</p>
		<p>1.6. Interactive tablecloth</p> <p>Interactive tablecloth is a delivery mode for facilitating group discussion. This mode is controlled with tangible interfaces, and provides a method for each group member's voice to be heard prior to discussion, thus preserving the diversity of responses.</p>	<ul style="list-style-type: none"> - Introduce a topics/problem - Divide into groups - Individual think and write their solutions/answers in the given section - Discuss to propose a group's common solution - Present in front of class 	<p>Poster Rubric (teamwork) Presentation</p>	<p>7,8,9</p>
		<p>1.7. Feedback</p>	<ul style="list-style-type: none"> - Organize for students to comment, evaluate products of learning activities (a presentation, a product of project or group, etc.) 	<p>Feedback</p>	<p>7</p>
		<p>1.8. Kipling technique</p> <p>This technique is often used for adding new ideas, considering many aspects of the problem, choosing the</p>	<p>Ask questions with What, When, Where, Who, Why, How</p>		<p>7</p>

		right ideas.			
Creativity Liberation	TLS2: Promoting self-reliance, self-study of learners	2.1. Seminar	<ul style="list-style-type: none"> - Introduce topics and assign tasks - Assigned student/group research and prepare a presentation report - Present and discuss (students) - Comment and conclude (lecturer) 	Essay Rubric Presentation Thesis	1,3,6,7,8,9
		2.2. Project-based learning	<ul style="list-style-type: none"> - Conceive a project (Identify real-world problem → Determine project's objectives → Seek for funding → Design assessment plan and tools) - Organize and guide students to conduct the project (Steps: Ideate → Design → Implement → Present) - Assess the project 	Rubric (project)	2,6,7,8,9,10
		2.3. Self-study	<ul style="list-style-type: none"> - Identify self-study contents - Make a self-study plan - Implement the plan - Discuss with friends/lecturer - Self-assess 	Rubric Test	1,3,7,9,10
		2.4. Research	<ul style="list-style-type: none"> - Determine a topic, objectives, and contents of research project - Search and study relevant references - Conduct the research project - Discuss, write a report 	Rubric Essay Thesis	1-10

			- Prepare presentation report and present		
Creativity Practicality	TLS3: Enhancing practice, practicality	3.1. Case study	<ul style="list-style-type: none"> - Select/create a case - Help students analyze the case (ask questions) - Guide students to deal with the case (Indicate plans or options) - Organize discussion and presentation 	Rubric Test	3,4,5
		3.2. Observation	<ul style="list-style-type: none"> - Identify objectives, objects and ways of observation - Prepare/Select observation situations (at high school or laboratory) - Organize observation - Collect feedback 	Report Application problem	3,4,5, 8
		3.3. Practice, Experiment	<ul style="list-style-type: none"> - Design experiment lessons - Prepare and arrange equipment - Guide students to design and implement experiment (steps: plan, setup, and implement experiment/practical activity, analyze results) - Discuss and Improve 	Report Rubric Performance Observation Through learning evidences	2,4,5, 8

2.3.2. General Rubrics

ER - Rubric for Experiment

Assessment areas	Poor (<5)	Fair (5-6)	Good (7-8)	Excellent (9-10)
Plan (25 %)	- The design of experiment procedure is not exact - Many necessary supplies need to be searched out	The design of experiment procedure is generally exact with several details that need refinement	The design of experiment procedure is generally exact with a few details that need refinement	The design of experiment procedure is exact and simple
	There is no job assignment between the members	There is a unclear job assignment between the members	There is a clear job assignment between the members	There is a clear job assignment between the members
Implement (25 %)	Lacks the appropriate knowledge of lab procedures	Demonstrates general knowledge of lab procedures	Demonstrates sound knowledge of lab procedures	Demonstrates very good knowledge of lab procedures
	Often requires help from the teacher to even complete basic procedures	Requires help from teacher with some steps in procedures	Carefully follows each step	Thoroughly and carefully follows each step before moving on to next step
	Work is not neat and organized	Work is not generally neat and organized	Work is generally neat and organized	Work is neat and organized
Analysis (25 %)	Analyze the results incorrectly somewhere.	Analyze the results exactly.	Analyze the results exactly.	Analyze the results exactly.
	Take significant figures incorrectly	Take significant figures incorrectly	Take significant figures correctly	Take significant figures exactly
	Not explain the discrepancy between the experimental results and	Explain the discrepancy between the experimental results and	Explain the discrepancy between the experimental results and	Explain the discrepancy between the experimental results and

	theory and several details that need refinement	theory but several details that need refinement	theory but a few details that need refinement	theory exactly
Presentation (25 %)	Refer to OPR			

PR - Rubric for Project

Assessment area		Max point	Criteria	
Implementation process	Title	4	4 points: meet 80% to 100 % the requirements of the criteria 3 points: meet 60 to 80 % the requirements of the criteria	
	Problems	4		
	Propose solutions	4		
	Implement solutions	4		
	Knowledge used, Knowledge obtained.	4		
Result	Presenta tion report	Accurate, scientific (content)	4	2 points: meet 40% to 60 % the requirements of the criteria 1 point: meet 20% to 40 % the requirements of the criteria
		Aesthetics (Slide form)	4	
		Using visual aids	4	
	Real product	Quality (works well)	4x2	
		Creative, scientific, aesthetics	4x2	
		Used materials (simple and cheap)	4	
Discussion	Answering questions	4		
Presentation	Refer to OPR	4		

OPR –Rubric for Oral Presentation

Assess- ment area	Fail (1-2)	Need Improvement (3-4)	Developing (5-6)	Sufficient (7-8)	Above Sufficient (9-10)
Content (30%)	Not show the topic clearly	Focus too much on overview but not in detail	Basically show the topic	Use suitable content but not clearly show the topic	Clearly show the topic in overview and detail

Slides (20%)	Hard to see words in slide due to the low contrast and too much words in one slide	High contrast but small words due to too much text in one slide	- Good contrast but unsuitable colors of background and text -Appropriate font size	-Appropriate contrast and colors -Appropriate font size	-Beautiful background and good contrast -Appropriate 7x7 rule
	No visual aids	A few visual aids but unclear and low qualified, unclear content showing	Enough basic visual aids	Appropriate distribution between pictures and videos	Clear explanation with explicit pictures
Presentation manners (40%)	No introduction	Correct object introduction but lengthy and incomplete	Correct object introduction and attractive introduction	Interesting introduction	Surprising, creative, and attractive introduction
	Speak too softly to be understood	Speak clearly but often repeat	Speak loudly, clearly, fluently but monotone and dull	Speak loudly, clearly, fluently, and inspirationally	Speak loudly, clearly, fluently, and fascinatingly
	Just stand at the same place, not cover the whole class, not interact with audiences	Move around but not cover the whole class, just use a few interactions	Move around and cover the whole class. Use a lot of interactions but do not make audiences interested	Move around, use lots of interactions, and make audiences interested	Move around, use lots of interactions, and make audiences interested in and take part in the presentation
	Shy, unconfident, often head-scratching	Confident but still confused when solving problems	Confident but not enthusiastic about answering questions Show the	Calm, confident but not passionate and enthusiastic about	Calm, confident, passionate, and enthusiastic about answering

			content	answering questions	audiences' questions
Time management (10%)	Inappropriate time distribution between parts Too much different from the scheduled time (>50%)	Presentation time is 20%-40% longer or shorter	Presentation time is 10%-20% longer or shorter	Presentation time is 5% - 10 % longer or shorter	Appropriate time distribution between parts Follow the scheduled time

TWR – Rubric for Team Work

Assessment area	Poor (<5)	Fair (5-6)	Good (7-8)	Excellent (9-10)
Preparation (20%)	Ill-prepared or unprepared for the meeting	Little prepared for the meeting	Well-prepared for the meeting	Well-prepared in detail
Organization (20%)	Let other members make plans	Partially participate in setting up the goal and making plans	Mostly participate in setting up the goal and making plans	Play a main role in setting up the goal and making plans
Participation (20%)	Passively observe and have no idea or opinion	Have discussions based on members' ideas	Actively participate in discussions and questioning	Actively participate in discussion and questioning and lead the discussions
Comprehension (20%)	Unable to/do not answer questions	Rarely speak and answer questions	Listen intently and show the comprehension by explaining the content	Listen intently and show the comprehension by explaining and developing the content
Level of interest (20%)	Show disinterest and want to do something else at another place	Often absent or late	Absent but inform in advance and manage to fulfill tasks	Voluntarily take the responsibility and share the tasks

AR – Rubric for Attendance

Assessment area	Poor (<5)	Fair (5-6)	Good (7-8)	Excellent (9-10)
Attendance (40%)	Student was absent from more than 2 classes and/or did not provide the instructor with reasonable excuses	Student was absent from 2 classes but provided the instructor with reasonable excuses	Student was absent from 1 class but provided the instructor with a reasonable excuse	Student was present at every class
Punctuality (30%)	Student was rarely on time or early (was tardy to class 4 or more times)	Student was sometimes on time (was tardy to class 3 times), but rarely arrived early	Student was usually on time or early for class (was tardy to class only 1 or twice)	Student was always on time for class and often arrived early
Level of participation and behavior (20%)	Student rarely participated in class discussions or asked questions Interaction with peers was poor	Student sometimes participated in class without being prompted Student was reluctant to join in discussions/ work with peers	Student often participated freely in class, asked questions, and participated in discussions/ work with peers cooperatively	Student brought original thought and perspective to class discussions, participated fully and actively in all classes, worked cooperatively and well with all of his/her peers

HWR – Rubric for Homework

Assessment area	Poor (<5)	Fair (5-6)	Good (7-8)	Excellent (9-10)
Amount (40%)	Lack ≥ 3 problems or complete problems but lack ≥ 7 small questions	Lack 2 problems or complete problems but lack 4 - 6 small questions	Lack 1 problem or complete problems but lack ≤ 3 small questions	Complete 100% of assigned assignments Complete all small questions
Accuracy of Answer (60%)	Under 50% accuracy was obtained	50% - 69 % accuracy was obtained	70% - 89 % accuracy was obtained	Over 90 % accuracy was obtained

2.3.3. Regulations on Examination and Assessment

2.3.3.1. Regulation on Course Assessment

The organization of final test, including test design, test form, grading, timeline, score calculation method, etc., is followed the “Full-time university and college training under the credit-based training system” regulations of MOET (Decision No. 17/VBHN-BGDDT dated on May 15th 2014). This regulation is published on the website <http://daotao.ued.udn.vn/quy-che-43-cua-bo-giao-duc-va-dao-tao-kem-theo-thong-tu-572012tt-bgddt-sua-doi-bo-sung/>.

2.3.3.2. Regulation on Capstone Project Assessment

The assessment of capstone project is conducted based on the UED's procedure, which is published on the website <http://daotao.ued.udn.vn/cac-bieu-mau-cham-diem-khoa-luan-tot-nghiep/>.

- Theses must be commented and approved by supervisors before submitting to the capstone project assessment committee (CPAC).

- Each thesis is reviewed and scored by the supervisor and a reviewer before being defended.

- The capstone project score (CPS) is determined by

$$\text{CPS} = \text{Score from the instructor} \times 0.25 + \text{Score from the reviewer} \times 0.25 \\ + \text{Score from CPAC} \times 0.5$$

- Score from CPAC is averaged from all members.

- Component scores are calculated in the 10-point grading scale and rounded to 0.25.

- CPS is also calculated in the 10-point grading scale and round to 0.01.

Rubrics for capstone project assessment consist of rubric for supervisors and reviewers (CPR1) and rubric for CPAC (CPR2).

CPR1 - Rubric for supervisors and reviewers

Assessment area	Criteria	Max point
Layout, form and references	<ul style="list-style-type: none">- Layout is close, logical.- Theses are formulated properly and have less than 5 printing errors.- References are cited correctly.	1.5

Content	<ul style="list-style-type: none"> - Clarify reasons for choosing the topic, objectives of the study. - Contents of chapters/items ensure logical, scientific accuracy. - The summary is brief and concise, meets the objectives, and faithfully reflects obtained results. - Recommendation is feasible, appropriate to the scope of research. - Language is clear, coherent. 	4
Method	<ul style="list-style-type: none"> - Use appropriate research method - Describe the research method (experimental procedure, data collection, information processing, indicators and monitoring methods, etc.) clearly. 	1.5
Results	<ul style="list-style-type: none"> - Meet the proposed objectives - Analyze and discuss obtained results correctly. 	3
Total		10

CPR2 - Rubric for CPAC

Assessment area	Score		
	5 – 6	7 – 8	9 – 10
Content (20%)	<ul style="list-style-type: none"> - Sketchy, lack of linkage of parts - Not show detailed analysis 	<ul style="list-style-type: none"> - Demonstrate fully content - Parts are linked 	Clearly show the topic in overview and detail
Layout (10%)	<ul style="list-style-type: none"> - Arrangement of chapters, items is not logical - Lack of tables and figures 	<ul style="list-style-type: none"> - Arrangement of chapters, items is generally logical - There are several errors; There are tables and figures 	<ul style="list-style-type: none"> - Arrangement of chapters, items is logical and scientific - Use tables and figures correctly
Form (10%)	<ul style="list-style-type: none"> - Font size, format, table, picture are incorrect - Many printing errors 	A few errors in font size, format, tables, pictures, printing (less than 10 errors)	<ul style="list-style-type: none"> - Font size, format, table, picture are correct - Less than 5 errors - Tables and pictures are beautiful
Presentation manner (10%)	<ul style="list-style-type: none"> - No introduction - Shy, unconfident, often head- scratching - Just read the 	<ul style="list-style-type: none"> - Interesting introduction - Calm, confident but not enthusiastic in answering questions 	<ul style="list-style-type: none"> - Surprising, creatively and attractive introduction - Calm, confident, enthusiastic, passionate

	content on slides.	and passionate	about answering audiences' questions
Expression (10%)	<ul style="list-style-type: none"> - Speak too softly to be understood; - Just stand at the same place, not cover the whole class, not interact with audiences 	<ul style="list-style-type: none"> - Speak loudly, clearly, fluently, and inspirationally - Move around, use lots of interactions and make audiences interested 	<ul style="list-style-type: none"> - Speak loudly, clearly, fluently, and fascinatingly - Move around, use lots of interactions and make audiences interested and take part in the presentation
Time management (10%)	<ul style="list-style-type: none"> - Inappropriate time distribution between parts - Too much different from the scheduled time (10% - 20%) 	Much different from the scheduled time (> 5% - 10%)	<ul style="list-style-type: none"> - Appropriate time distribution between parts - Follow the scheduled time
Slide (10%)	<ul style="list-style-type: none"> - Hard to see words in slide due to the low contrast and too much words in one slide - No visual aids 	<ul style="list-style-type: none"> - Good contrast but unsuitable colors of background and text - Appropriate font size - Enough basic visual aids 	<ul style="list-style-type: none"> - Beautiful background and good contrast; - Clear explanation with explicit pictures.
Answer (20%)	Answer correctly 40% questions	Answer correctly 60% questions	Answer correctly all questions

2.3.3.3. Regulation on Internship Assessment

The regulations, guidelines, and forms related to internship courses are followed the “Pedagogical Internship – full-time training under the credit-based training system and satellite school model” regulation of UED. This regulation is published in the Decision No. 94/QĐ-ĐT dated on February 17th 2016 by the UED’s Rector and on the website <http://daotao.ued.udn.vn/quy-dinh-va-bieu-mau-thuc-tap-su-pham/>.

PART 3. PROGRAM STRUCTURE AND CONTENT

3.1. Program Structure

Knowledge cluster	Compulsory credits	Selective credits	Total credits
General knowledge	21	0	21
Foundation knowledge	13	0	13
Core knowledge	45	25	70
Professional competence in education	41	10	51
Total	120	35	155

- **General knowledge** includes 14 courses of foreign language, IT, politics, physical education, and national defense. This knowledge cluster helps students develop common skills and sense of responsibility for themselves and society.
- **Foundation knowledge** includes 4 courses of Mathematics, Chemistry, and Biology. This knowledge cluster equips students with basic knowledge about Mathematics and Natural Sciences related Physics.
- **Core knowledge** includes 25 courses related to Physics. This knowledge cluster equips students with full knowledge system of classical physics, modern physics, and specialized physics. It also develops generic and lifelong learning skills for students.
- **Professional competence in education** includes 19 courses related to methodology of teaching, theories of pedagogics and psychology. This knowledge cluster helps students develop skills of designing and organizing educational and Physics teaching activities.

3.2. Curriculum

No.	Course Code	Name of course	Credit			Prerequisite
			Total	Theory	Experiment	
		GENERAL KNOWLEDGE				
1	212 2 1512	The Basic Principles of Marxism-Leninism (1)	2	2	0	
2	213 3 1513	The Basic Principles of Marxism-Leninism (2)	3	3	0	
3	213 2 1922	Ho Chi Minh Thought	2	2	0	
4	212 3 1225	Revolutionary policies of the	3	3	0	

		Vietnam communist party				
5	312 2 1885	General Informatics	2	1	1	
6	412 3 1858	English A2.1	3	3	0	
7	412 4 1859	English A2.2	4	4	0	English A2.1
8	316 2 1549	General Law	2	2	0	
9	001 0 1265	<i>Physical Education 1</i>	(1)	(0)	(1)	
10	001 0 1266	<i>Physical Education 2</i>	(1)	(0)	(1)	
11	001 0 1267	<i>Physical Education 3</i>	(1)	(0)	(1)	
12	001 0 1268	<i>Physical Education 4</i>	(1)	(0)	(1)	
13	001 0 1269	<i>Physical Education 5</i>	(1)	(0)	(1)	
14	002 0 1264	<i>National Defense Education</i>	(4t)			
		TOTAL CREDITS OF THE CLUSTER	21	20	1	
		FOUNDATION KNOWLEDGE				
15	311 4 1900	Higher Mathematics 1	4	4	0	
16	311 4 1901	Higher Mathematics 2	4	4	0	Higher Math. 1
17	314 3 1299	General Chemistry	3	3	0	
18	320 2 1641	General Biology	2	2	0	
		CORE KNOWLEDGE				
19	315 2 1678	Mathematics for Physics	2	2	0	
20	313 3 1904	Mechanics	3	3	0	
21	313 4 1069	Thermodynamics	4	4	0	
22	313 4 1983	Electricity and Magnetism	4	4	0	
23	313 4 1200	Optics	4	4	0	Oscillation and Mechanical Wave
24	313 3 1660	Atomic and Nuclear Physics	3	3	0	
25	313 3 1982	Oscillations and Waves	3	3	0	Mechanics
26	313 2 1154	Theoretical Mechanics	2	2	0	
27	313 3 1071	Classical Electrodynamics	3	3	0	Electricity and Magnetism
28	313 3 1195	Statistical Physics	3	3	0	Thermodynamics
29	313 2 1985	Solid State Physics	2	2	0	
30	313 3 1975	Quantum Mechanics	3	3	0	
31	313 3 1070	Astrophysics	3	3	0	
32	313 2 1984	General Physics Experiment 1	2	2	0	Mechanics
33	313 2 1828	General Physics Experiment 2	2	0	2	Electricity & Magnetism
34	313 2 1829	General Physics Experiment 3	2	0	2	Thermodynamics Optics
		TOTAL CREDITS OF THE CLUSTER	58	52	6	

		PROFESSIONAL COMPETENCE IN EDUCATION				
35	313 2 1830	State Administrative and Educational Management				
36	313 3 1161	Integrated Teaching of Natural Sciences (Physics)	3	3	0	Methodology of Teaching Physics
37	320 4 1719	Pedagogical Psychology	4	4	0	
38	320 3 1255	Pedagogics	3	3	0	
39	320 2 1820	Pedagogical Psychology Practice	2	0	2	Pedagogical Psychology
40	320 2 1273	Pedagogical Communication	2	2	0	Pedagogical Psychology
41	313 2 1591	Research Methodology in Educational Science (Physics)	2	2	0	Pedagogics
42	313 3 1441	Methodology of Teaching Physics	3	3	0	Pedagogics
43	313 3 1544	Analysis and development of High-School Physics Program	3	3	0	Methodology of Teaching Physics
44	313 3 1609	Teaching Methods and Techniques (Physics)	3	3	0	Methodology of Teaching Physics
45	313 3 1745	High-School Physics Experiment	3	0	3	
46	313 2 1354	Assessment in Teaching Physics	2	2	0	Methodology of Teaching Physics
47	313 3 1794	Physics Teaching Practice (at UED)	3	0	3	Methodology of Teaching Physics
48	303 3 1845	Internship 1	3	0	3	Methodology of Teaching Physics
49	303 3 1846	Internship 2	3	0	3	Internship 1
		TOTAL CREDITS OF THE CLUSTER	41	27	14	
		<i>SELECTIVE COURSES</i>				
50	331 2 1252	<i>Sexual Education</i>	2	2	0	
51	320 2 1373	<i>School Consulting Skills</i>	2	2	0	
52	313 2 1578	<i>Methods of Solving High-School Physics Problems</i>	2	2	0	
53	313 2 1887	<i>IT applications in Physics</i>	2	1	1	
54	313 2 1928	<i>IT applications in Teaching Physics</i>	2	0	2	
55	313 2 1197	<i>Engineering Electricity</i>	2	1	1	
56	313 3 1199	<i>Basic Electronics</i>	3	2	1	
57	313 2 1508	<i>Introduction to Physics Teacher Education</i>	2	1	1	
58	313 2 1860	<i>English for Physics</i>	2	2	0	
59	313 2 1052	<i>Atomic Spectra and Structure</i>	2	2	0	

60	313 2 1769	<i>Optical Communications</i>	2	2	0	
61	313 2 1753	<i>Equipment and Methods of Spectral Analysis</i>	2	2	0	
62	313 2 1981	<i>Nano Physics</i>	2	2	0	
63	313 2 1974	<i>Semiconductor Physics</i>	2	2	0	
64	303 6 1338	<i>Capstone Project</i>	6	0	6	
		TOTAL CREDITS OF THE CLUSTER	35	23	12	
TOTAL CREDITS OF THE CURRICULUM			155			
Total credits of the required courses			120			
Total credits of the selective courses			15			

- *Note: No credit for Physical Education, National Defense Education.*

3.3. Training schedule

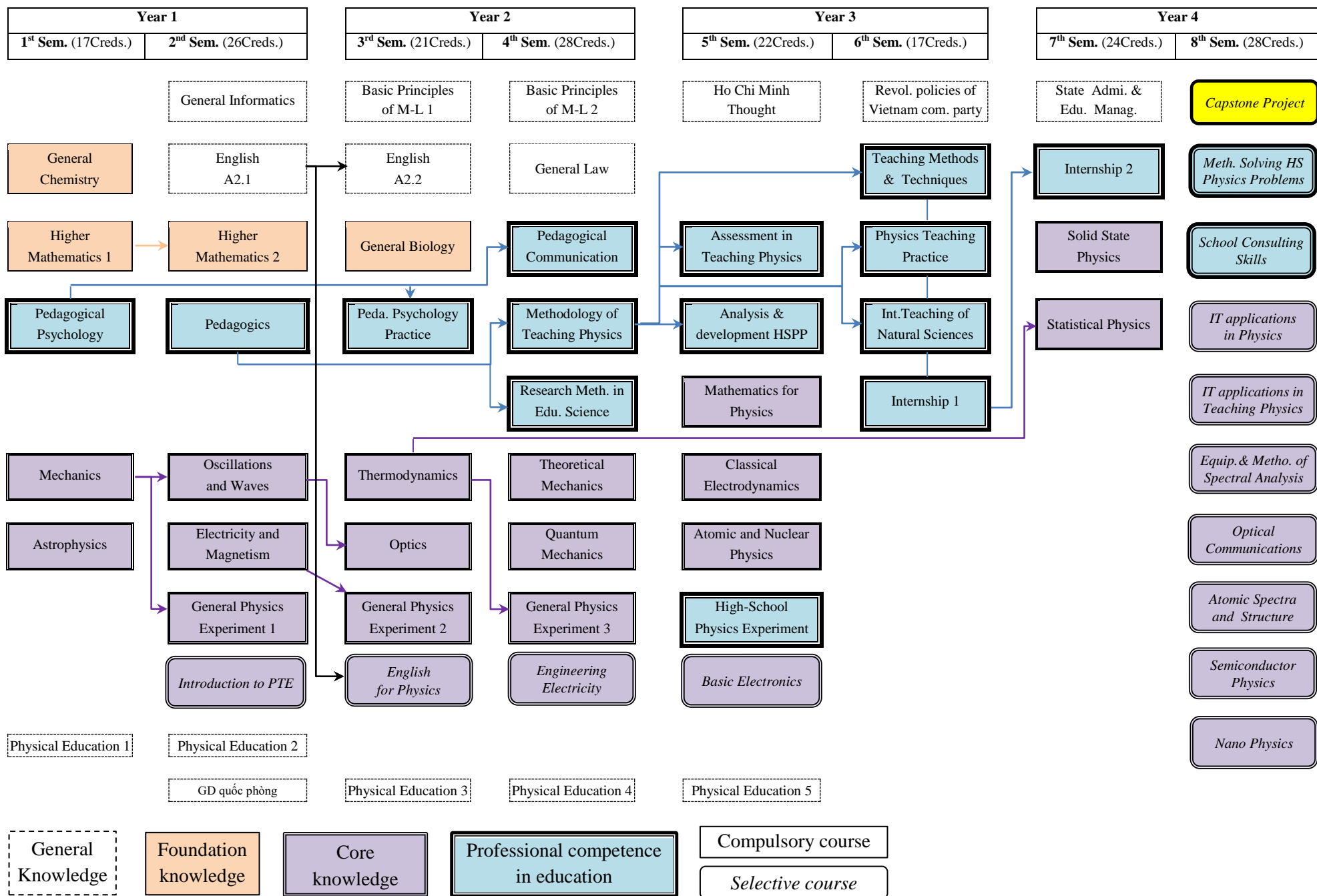
Sem-ester	Course Code	NAME OF COURSE	Credit			Prerequisite	
			Total	Theory	Exper-iment		
1 st	320 4 1719	Pedagogical Psychology	4	4	0		
	314 3 1299	General Chemistry	3	3	0		
	311 4 1900	Higher Mathematics 1	4	4	0		
	313 4 1069	Mechanics	4	4	0		
	313 2 1984	Astrophysics	2	2	0		
	001 0 1265	<i>Physical Education 1</i>	(1)	0	(1)		
	Total credits in the semester			17	17	0	
2 nd	412 3 1858	English A2.1	3	3	0		
	312 2 1885	General Informatics (Informatics CN1)	2	1	1		
	320 3 1255	Pedagogics	3	3	0		
	311 4 1901	Higher Mathematics 2	4	4	0	Higher Math. 1	
	313 4 1200	Electricity and Magnetism	4	4	0		
	313 2 1154	Oscillations and Waves	2	2	0	Mechanics	
	313 2 1828	General Physics Experiment 1	2	0	2	Mechanics	
	<i>Selective Courses</i>						
	313 2 1508	<i>Introduction to Physics Teacher Education</i>	2	1	1		
	001 0 1266	<i>Physical Education 2</i>	(1)	0	(1)		
	002 0 1264	<i>National Defense Education</i>	(4t)				
Total credits in the semester			22	18	4		
3 rd	212 2 1512	The Basic Principles of Marxism-Leninism (1)	2	2	0		
	412 3 1859	English A2.2	4	4	0	English A2.1	
	320 2 1820	Pedagogical Psychology Practice	2	0	2	Pedagogical Psychology	
	315 2 1678	General biology	2	2	0		
	313 3 1660	Optics	3	3	0	Oscillation and Mechanical Wave	

	313 4 1983	Thermodynamics	4	4	0	
	313 2 1829	General Physics Experiment 2	2	0	2	Electricity and Magnetism
	<i>Selective Course</i>					
	313 2 1860	<i>English for Physics</i>	2	2	0	English A2.1
	001 0 1267	<i>Physical Education 3</i>	(1)	0	(1)	
	Total credits in the semester		21	17	4	
4 th	212 2 1513	The Basic Principles of Marxism-Leninism (2)	3	3	0	
	316 2 1549	General Law	2	2	0	
	320 2 1273	Pedagogical Communication	2	2	0	Pedagogical Psychology
	313 3 1441	Methodology of Teaching Physics	3	3	0	Pedagogics
	313 2 1591	Research Methodology in Educational Science (Physics)	2	2	0	Pedagogics
	313 3 1071	Theoretical Mechanics	3	3	0	
	313 3 1070	Quantum Mechanics	3	3	0	
	313 2 1830	General Physics Experiment 3	2	0	2	Thermodynamics
	<i>Selective Course</i>					
	313 2 1197	<i>Engineering Electricity</i>	2	1	1	
	001 0 1267	<i>Physical Education 4</i>	(1)	0	(1)	
	Total credits in the semester		22	19	3	
5 th	213 2 1922	Ho Chi Minh Thought	2	2	0	
	313 3 1745	High-School Physics Experiment	3	0	3	
	313 3 1544	Analysis and Development of High-School Physics Program	3	3	0	Methodology of Teaching Physics
	313 3 1354	Assessment in Teaching Physics	2	2	0	Methodology of Teaching Physics
	313 3 1904	Mathematics for Physics	3	3	0	
	313 3 1195	Classical Electrodynamics	3	3	0	Electricity and Magnetism
	313 3 1982	Atomic and Nuclear Physics	3	3	0	
	<i>Selective Courses</i>					
	313 3 1199	<i>Basic Electronics</i>	3	2	1	
	001 0 1268	<i>Physical Education 5</i>	(1)	0	(1)	
Total credits in the semester		22	18	4		
6 th	212 3 1225	Revolutionary Policies of the Vietnam Communist Party	3	3	0	
	313 3 1609	Teaching methods and techniques (Physics)	3	3	0	Methodology of Teaching Physics
	313 3 1794	Physics Teaching Practice (at UED)	3	0	3	Methodology of Teaching Physics
	313 3 1161	Integrated Teaching of Natural Sciences (Physics)	3	3	0	Methodology of Teaching Physics
	313 3 1845	Internship 1	3	0	3	
	Total Credits in the semester		15	9	6	

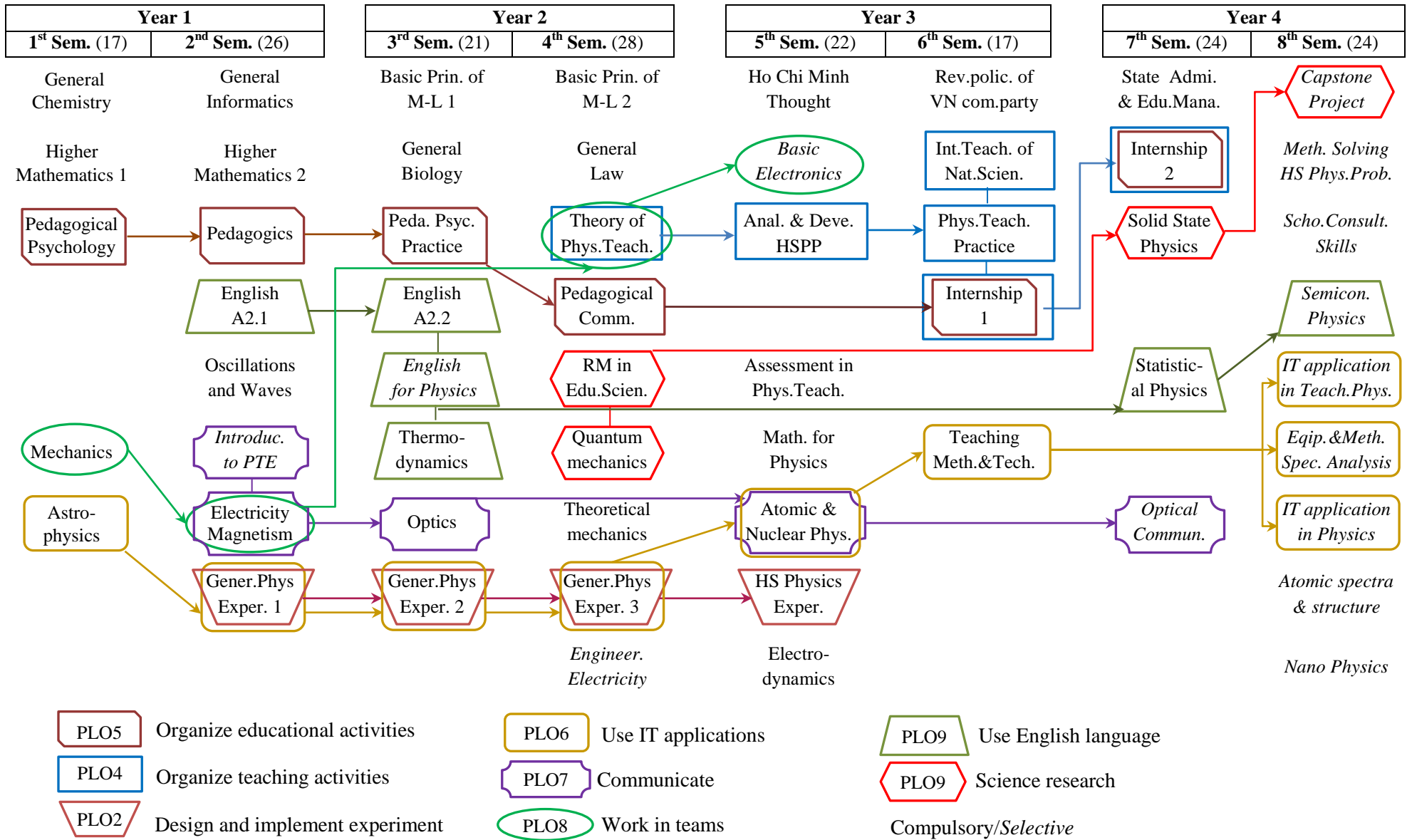
7 th	320 2 1641	State Administrative and Educational Management	2	2	0		
	313 3 1975	Solid State Physics	3	3	0		
	313 3 1985	Statistical Physics	2	2	0	Thermodynamics	
	313 3 1845	Internship 2	3	0	3		
	Total credits in the semester		10	7	3		
8 th	<i>Selective Courses</i>						
	303 6 1338	Capstone Project	6	0	6		
	313 2 1928	IT applications in Teaching Physics	2	0	2		
	313 2 1887	IT applications in Physics	2	1	1		
	313 2 1578	Methods of Solving High-School Physics Problems	2	2	0		
	320 2 1373	School Consulting Skills	2	2	0		
	331 2 1252	Sex Education Methods	2	2	0		
	313 2 1052	Atomic Spectra and Structure	2	2	0		
	313 2 1769	Optical Communications	2	2	0		
	313 2 1753	Equipment & methods of Spectral Analysis	2	2	0		
	313 2 1981	Nano Physics	2	2	0		
	313 2 1974	Semiconductor Physics	2	2	0		
	Total credits in the semester		26	17	9		

3.3.1. Roadmap to Teach Knowledge

(See the block diagram on the next page)



3.3.2. Roadmap to Teach Skills



3.4. Mapping between PLOs and Courses

Code	Course	PLO									
		1	2	3	4	5	6	7	8	9	10
	General Knowledge										
212 2 1512	The basic principles of Marxism-Leninism (1)						L	L			H
213 3 1513	The basic principles of Marxism-Leninism (2)						L	L			H
213 2 1922	Ho Chi Minh Thought						L	L			H
212 3 1225	Revolutionary policies of the Vietnam communist party						L	L			H
312 2 1885	General Informatics						H	L	L		
412 3 1858	English A2.1							H		M	
412 4 1859	English A2.2							H		M	
316 2 1549	General law						L	L			H
	Foundation Knowledge										
311 4 1900	Higher Mathematics 1	H						L		M	
311 4 1901	Higher Mathematics 2	H						L		M	
314 3 1299	General Chemistry	M						M	M	L	
315 2 1678	General Biology	M						M		L	
	Core Knowledge										
313 3 1904	Mathematics for Physics	H							M	M	
313 4 1069	Mechanics	H					L	L	H	M	
313 4 1983	Thermodynamics	H					L	L	H	M	
313 4 1200	Electricity and Magnetism	H					L	M	H	M	
313 3 1660	Optics	H					L	H	L	M	
313 3 1982	Atomic and Nuclear Physics	H					H	H	M	M	
313 2 1154	Oscillations and Waves	H					L	M	M	M	
313 3 1071	Theoretical Mechanics	H					L	L	L	M	
313 3 1195	Classical Electrodynamics	H					L	M	M	L	
313 2 1985	Statistical Physics	H					L	M	M	H	
313 3 1975	Solid State Physics	H						L	M	L	
313 3 1070	Quantum Mechanics	H						L	M	L	
313 2 1984	Astrophysics	H						L	M	L	
313 2 1828	General Physics Experiment 1	M	H				M	H	H	M	
313 2 1829	General Physics Experiment 2	M	H				M	H	H	M	

313	2	1830	General Physics Experiment 3	M	H				M	H	H	M	
			Professional Competence In Education										
320	2	1641	State Administrative and Educational Management					M					L
313	3	1161	Integrated Teaching of Natural Sciences (Physics)	M		H	H			M			
320	4	1719	Pedagogical Psychology					H		M	L		
320	3	1255	Pedagogics					H			M		
320	2	1820	Psychological Psychology Practice					H		M	H		
320	2	1273	Pedagogical Communication					H		H		L	
313	2	1591	Research Methodology of Educational Science (Physics)						L	H	M	H	
313	3	1441	Methodology of Teaching Physics			H	L			L	H	L	
313	3	1544	Analysis and Development of High School Physics Program			H	H						
313	3	1609	Teaching Methods and Techniques (Physics)			L			H	M	H	M	
313	3	1745	High School Physics Experiment	M	H		M			H	M	L	
313	2	1354	Assessment in Teaching Physics			H	M		H		M	M	
313	3	1794	Physics Teaching Practice (at UED)			H	H		L	H		L	
303	3	1845	Internship 1	M	L	H	H	H	M	H	L	M	H
303	3	1846	Internship 2	M	L	H	H	H	M	H	L	M	H
			<i>SELECTIVE COURSES</i>										
331	2	1252	<i>Sexual Education</i>					H		L		L	
320	2	1373	<i>School Consulting Skills</i>					H		L		L	
313	2	1578	<i>Methods of Solving High-School Physics Problems</i>	M		M	L			L		M	
313	2	1887	<i>IT applications in Physics</i>	M					H	H	M	M	
313	2	1928	<i>IT applications in Teaching Physics</i>	M					H	M	M	M	
313	2	1197	<i>Engineering Electricity</i>	M						L	M	L	
313	3	1199	<i>Basic Electronics</i>	M					M			L	
313	2	1508	<i>Introduction to Physics Teacher Education</i>			M	L	L		L	M		

313	2	1860	<i>English for Physics</i>							M	L	H	
313	2	1052	<i>Atomic Spectra and Structure</i>	H						L	M	L	
313	2	1769	<i>Optical Communications</i>	H						L	M	L	
313	2	1753	<i>Equipment and Methods of Spectral Analysis</i>	H						L	M	L	
313	2	1981	<i>Nano Physics</i>	H						L	M	L	
313	2	1974	<i>Semiconductor Physics</i>	H						L	M	L	
303	6	1338	<i>Capstone Project</i>	H	M	H	M	M	H	H	H	H	M

3.5. Abstract of Courses

3.5.1. General Knowledge

21221512 - The Basic Principles of Marxism-Leninism (1)

Credits 2

The module provides basic knowledge of Marxism-Leninism: material and consciousness; pairs of categories of materialist dialectics; the role of production and rules of production relations in line with the development level of the productive forces; infrastructure and superstructure; class and class struggle; the people and the creative role of the history of the people.

21331513 - The Basic Principles of Marxism-Leninism (2)

Credits 3

The module is equipped with knowledge of the doctrine of Marxism Leninism in commodity economics, the mode of capitalist production in both periods of freedom of competition and the monopoly period. The theory of Leninism on socialism, the study of the economic, political and social issues of the communist model.

21321922 - Ho Chi Minh Thought

Credits 2

The module provides the basic contents of Ho Chi Minh's thoughts on: Ethnic issues and the revolution of national liberation; on socialism; about the Communist Party of Vietnam; about the great unity; the construction of a new state in Vietnam and the ethics, culture and the construction of new people ... along with the creation of theory and practice directed the democratic national revolution and social Vietnam's Ho Chi Minh.

21231225 - Revolutionary policies of the Vietnam communist party

Credits 3

The module focuses on clarifying the birth of the Communist Party of Vietnam, the policy of fighting for power, national liberation, reunification of the motherland; the way of industrialization, the building of a socialist-oriented market economy, the building of the political system, the development of the culture, the settlement of social issues and

the foreign policy.

31221885 - General Informatics

Credits 2

This course aims to provide students with basic knowledge of information technology, computer and computer network, develop skills of using proficiently computer and usual application software such as MS Word, MS Excel and MS PowerPoint, and facilitate students accessing the online working environment.

41231858 - English A2.1

Credits 3

This module is designed in combination with four skills: Listening, Speaking, Reading and Writing combined with the target grammar. The content of this module is presented in three units; each unit covers 7 lessons:

- Lesson A introduces the topic of the unit, presents the main vocabulary set, and practices it through listening and other activities
- Lesson B presents and practices the first main grammar point of the unit.
- Lesson C has a reading text which provides cultural information about Britain, the USA or other English- speaking countries.
- Lesson D presents and practices the second main grammar point of the unit.
- Lesson E contains the main reading text of the unit.
- Lesson F presents a functional dialogue.
- Lesson G focuses on writing.

After each unit about integrated skills, there will be a language review in order to enable students to practice and thoroughly prepare for Test 1 and 2. Exam tasks follow the format of the Listening and Reading tests including the following parts: True /False /No Information, multiple choice, gap – filling (grammar), cloze (grammar), matching (reading), topic- based writing.

41241859 - English A2.2

Credits 4

This module is designed to integrate the four skills of Listening, Speaking, Reading, and Writing along with grammar points. Course content is presented in 4 units, each unit consists of 7 lessons:

- Lesson A: vocabulary and listening comprehension skills
- Lesson B: grammar skills
- Lesson C: cultural knowledge
- Lesson D: grammar

- Lesson E.: reading skills
- Lesson F: skills in oral communication
- Lesson G: writing skills in English

After each unit about integrated skills, there will be a language review in order to enable students to practice and thoroughly prepare for Test 1 and 2. Exam tasks follow the format of the Listening and Reading tests including the following parts: True /False /No Information, multiple choice, gap – filling (grammar), cloze (grammar), matching (reading), topic- based writing.

31621549 - General law Credits 2

The General Law course has been designed to provide learners with the most basic knowledge about the state and the law, such as: State apparatus, legal norms and legal relationships, law violations, etc. The course also provides some basic knowledge about Civil Law, Administrative Law, Criminal Law and Anti-Corruption Law.

3.5.2. Foundation Knowledge

31141900 - Higher Mathematics 1 Credits 4

Topics include basics knowledge about limit, continuity, derivative and differential, integral, improper integral and applications of functions of one variable, limit, continuity, partial derivative and differential and applications of functions of several variables, double integral and triple integral.

31141901 - Higher Mathematics 2 Credits 4

This course includes concepts, formulas and applications of line integrals (type I and II), surface integrals (type I and type II), series (number and functional series) and ordinary differential equations, matrices, determinants and systems of linear equations.

31431299 - General Chemistry Credits 3

This course provides basic knowledge of chemistry related to all areas, namely: basic concepts and laws of chemistry, atomic structure, the periodic system of chemical elements; chemical bonding and knowledge of condensed state (mainly on crystals), fundamental principles of thermodynamics, chemical dynamics, electrochemistry.

32021641 - General Biology Credits 2

This course introduces to students knowledge of feature properties and systems of living things, from the molecular level to the biosphere level. These are important basics for students to understand the structure, functions and processes of metabolism, energy

accumulation as well as the scientific basis of other biological processes and the evolution theory.

3.5.3. Core Knowledge

31521678 - Mathematics for Physics

Credits 3

This course focuses on three main topics (wave equation, heat transfer, and Laplace's and Poisson's equations) that is structured in four chapters as follows:

- Chapter 1: Introduction and relevant knowledge of mathematics including operator and methods to solve the differential equations,
- Chapter 2: Equations of wave propagating on finite or infinite strings and in thin films,
- Chapter 3: Heat transfer equations,
- Chapter 4: Laplace's and Poisson's equations.

31331904 – Mechanics

Credits 4

This course tends to give students opportunity to explore the basic concepts and principles of mechanics including concepts of coordinates, velocity, acceleration, force and mechanical forces, momentum, kinetic energy, potential energy; common forms of motion such as straight motion, curved motion, circular motion, radial motion; the fundamental laws and theorems of mechanics; fluid mechanics; and relativistic mechanics. In addition, this course helps students initially develop skills of teamwork.

31341069 – Thermodynamics

Credits 4

This course tends to give students opportunity to explore the basic concepts and principles of heat and thermodynamics (including the concepts of temperature, heat, work, internal energy; the kinetic theory of gases; the laws of thermodynamics; heat engines and refrigerators; heat phenomena; real gases, liquid, and solid; phases and phase transition; and thermodynamic functions) and explain real phenomena related to heat and thermodynamics. In addition, this course along with the course of English for Physics helps students initially develop skills of using English language.

31341983 - Electricity and Magnetism

Credits 4

The course is about electricity and magnetism from Coulomb's law through Maxwell's equations; electrostatics, electric potential; capacitors; electric fields; current and circuits; magnetic fields in matter; induction, DC & AC circuits; electromagnetic waves. This course also helps students develop skills of teamwork and communication.

31341200 – Optics**Credits 3**

This course studies the nature and properties of light, its propagation and its interaction with matter. This course can be considered as 5 main parts:

- Principles of ray optics;
- Optical interference;
- Diffraction of light, polarization and absorption of light;
- Thermal radiation;
- Particle nature of light.

Additionally, this course helps students further develop skill of communication.

31331660 - Atomic and Nuclear Physics**Credits 3**

This module provides students with basic and modern knowledge about atoms and atomic nuclei including atomic and nuclear structure according to quantum theory; phenomena and laws of radioactivity and nuclear reactions, their applications in real world and technology (using radioactive isotopes, nuclear power plants, atomic bombs, nuclear power). In addition, this course helps students further develop skills of communication and using IT applications.

31331982 - Oscillations and Waves**Credits 2**

This course consist of two parts as follows:

- Part 1: Types of oscillation including harmonic oscillation, damp oscillation, periodic oscillation, forced oscillation of the mechanical and electromagnetic oscillators;
- Part 2: Concepts and principles of wave including mechanical waves, Huygens' principle, wave function, wave energy, wave propagation, phase/group velocity of wave, principle of overlapping wave and interference, sound wave, ultrasound wave, Doppler effect, electromagnetic waves and properties of electromagnetic waves.

31321154 - Theoretical Mechanics**Credits 3**

This course tends to give students opportunity to explore the basic concepts and principles of theoretical mechanics, including the number of degrees of freedom, generalized coordinates, generalized velocity, Lagrange function, Lagrange equation, Hamilton function, Hamilton equation, applications of Lagrangian and Hamiltonian mechanics for mechanic system as radial motion, small oscillation, and motion of a rigid body.

31331071 - Classical Electrodynamics**Credits 3**

The study of electrical and magnetic phenomena by means of mathematical tools is mainly. Electric and magnetic fields are uniform and correspond to each other forming the electromagnetic (electromagnetic field). The main purpose is to describe the empirical proof of electromagnetic theory and the theoretical construction in the local form, i.e., in the form of the relationship between physical quantities at the same point in space and time. In most cases, these relationships are expressed as differential equations. The final product is Maxwell's equations obtained as a result of generalization and mathematical formulas based on empirically established facts. Interaction analysis of particles within the framework of classical theory (i.e., not using any quantum concept) and not taking into account relativistic effects.

31331195 - Statistical Physics

Credits 2

This course tends to give students opportunity to explore the basic concepts, principles and statistical methods used for considering thermodynamic systems and facilitate students applying statistical methods to solve problems and explain phenomena related to ideal gas systems in equilibrium under isothermal conditions. In addition, this course helps students develop skill of using English (including using expertly physical science terminologies as well as listening, speaking, reading and writing) in study and research.

31321985 - Solid State Physics

Credits 3

This course provides basic knowledge about:

- Crystallography, lattice vibration (phonon), electrical conductivity, and theory of band structures in crystals;
- Types of semiconductors, structures related to semiconductors, metals, and contact phenomena between them;
- Lasers, general principle, structure, and operation of basic types of laser;
- Superconductors, different approaches in high-temperature superconducting theory.

In addition, this course helps students further develop the scientific research skill.

31331975 - Quantum Mechanics

Credits 3

The module consists of 5 chapters to help students master the knowledge of operator, operator's eigen value and function; postulates of quantum mechanics including Heisenberg uncertainty and Schrodinger equation; one-dimensional motion in

finite and infinite potential wells; one-dimensional oscillator; and motion in Coulomb's field. In addition, this course helps students initially develop skill of doing science research.

31331070 – Astrophysics

Credits 2

The Astrophysics course introduces to students the basics of cosmology and cosmology, from which learners can explain common phenomena observed in the sky, calculate the parameters in the problems in the astronomical bridge, timing system, etc. In addition, this module also facilitates the learner to develop presentation skills, work group to solve some issues related to practice. Additionally, this course helps students initially develop skill of using IT applications.

31321984 - General Physics Experiment 1

Credits 2

This course consists of seven experiments of Mechanics:

- Experiment 1: Basic equipment
- Experiment 2: Measurement of density of solid
- Experiment 3: Newton's law II. Work-energy theorem. Mechanical energy conversation law
- Experiment 4: Measurement of viscosity by the Stokes method
- Experiment 5: Measurement of the moment of inertia by oscillation method
- Experiment 6: Stand wave on a string
- Experiment 7: Measurement of gravitational acceleration using a simple gravity pendulum

This course helps students develop skill of using IT applications and initially develop skill of designing and conducting experiments.

31321828 - General Physics Experiment 2

Credits 2

This course consists of 7 experiments on Electricity and Magnetism:

- Experiment 1: Basic equipment
- Experiment 2: Magnetic field of paired coils in Helmholtz arrangement
- Experiment 3: Measurement of Earth's magnetic field
- Experiment 4: Measurement of Specific charge of the electron – e/m
- Experiment 5: Analysis of LRC circuit with oscilloscope
- Experiment 6: Measurement of resistance by Wheastone method
- Experiment 7: Assembly of simple home circuit

This course helps students further develop skills of using IT applications, designing and conducting experiments.

31321829 - General Physics Experiment 3 **Credits 2**

This course consists of 06 experiments of Thermodynamics and Optics:

- Experiment 1: Linear expansion of solid
- Experiment 2: Tension coefficient of liquid
- Experiment 3: Newton's ring
- Experiment 4: Light interference using Fresnel biprism
- Experiment 5: Diffraction of light using a narrow slit
- Experiment 6: Refraction index of glass using a microscope

This course helps students enhance skills of using IT applications, designing and conducting experiments.

3.5.4. Professional Competence In Education

31321830 - State Administrative and Educational Management **Credits 2**

The course introduces the basic issues of state administrative management, civil service, civil servants and officials; The Party and State's views on education and training; the law on education and other legal documents on education and training; the fact of Vietnamese educational system.

31331161 - Integrated Teaching of Natural Sciences (Physics) **Credits 3**

The course helps students exploring a very new teaching strategy, namely Integrated Teaching that has been applied to the new general education curriculum since 2017 in Vietnam, and applying this strategy to teaching natural sciences. The course content are divided into 3 parts as follows:

- Theory of integrated teaching (Overview of general education curriculum, natural science curriculum in Secondary Level, integrated teaching, integrated teaching methods and techniques);
- Practice to design the topics for integrated teaching in the field of natural sciences at high school
- Practice to teach an integrated topic.

32041719 - Pedagogical Psychology **Credits 4**

This module introduces the basic contents of ages psychology and pedagogical psychology such as: theories of child psychological development, the rules of child

psychological development; An overview of junior and senior high school students' age, including psychological development, character traits, communication and development of secondary and high school age. On the other hand, the module provides an overview of teaching psychology and educational psychology, such as the teaching process and its underlying elements, the psychology of knowledge acquisition, skills, teaching and intellectual development along with the psychological characteristics of learning. In addition, the module provides learners with the psychological foundations of moral education; value orientation and characteristics of pedagogical work and qualification and competence requirements of teachers. In addition, the module provides knowledge about mental health such as the concept of mental health, the causes of mental disorders, some of the common mental health problems in school students.

32031255 - Pedagogics

Credits 3

This course introduces the basics fundamentals of pedagogics. The content of the course consists of

- Part 1: The most common fundamentals of pedagogics such as pedagogics as a science, education and development, objectives and principles of education, pedagogical activities of teachers in the school;
- Part 2: The fundamentals of theory of teaching such as overview of teaching process, teaching content, teaching-learning approaches, student assessments;
- Part 3: The fundamentals of theory of pedagogics such as overview of education, contents and methods of education, organizing educational activities and managing class in high schools.

In addition, this course helps students develop skill of organizing educational activities.

32021820 - Pedagogical Psychology Practice

Credits 2

The content of course consists of main parts:

- Part 1: Help students develop skills of managing students and class;
- Part 2: Help students develop skills of organizing educational activities in secondary and high schools;
- Part 3: Behaviors of students in classroom and monitoring behaviors of students in classroom.
- Part 4: Help students develop skills in identifying students' counseling needs and

basic counseling skills such as: Listening skills, questioning skills, feedback skills, empathy.

32021273 - Pedagogical Communication

Credits 2

The course helps students develop basic skills in pedagogical communication. The content of the course includes two parts:

Part 1: Theory of pedagogic communication: fundamentals of pedagogical communication such as the concept of communication and pedagogical communication; aspects of pedagogical communication; factors that control pedagogical communication; principles and manners in pedagogical communication;

Part 2: Development of pedagogical communication skills: help students develop basic pedagogical communication skills such as orientation skills, interpersonal communication skills, presentation skills, listening skills, questioning skills, feedback skills, self-management skills, pedagogical skills.

31321591 – Research Methodology in Educational Science (Physics) Credits 2

This course provides students with basic knowledge of science and scientific research, the nature of scientific research as well as the logical structure of a scientific thesis.

The course also helps students develop scientific research skills such as building and presenting scientific arguments; presenting a scientific report, writing a scientific paper and apply scientific research skills to study at university.

31331441 - Methodology of Teaching Physics

Credits 3

This course provide basic theory in teaching Physics in school. The course content can be divided into 4 main parts:

+ Part 1: (Chapter I) Refers to common problems: Objects of physics teaching theory; Common objectives and tasks of teaching; Concepts of teaching methods and logic of teaching process.

+ Part 2: (Chapter II and III) Analyze basic tasks of teaching Physics in schools and the teaching approaches used in teaching Physics .

+ Part 3: (Chapters IV and V) Analyze process of using Physics test and teaching facilities in Physics teaching process.

+ Part 4: (Chapter VI and chapter VII) Refers to teacher's activities in implementing teaching process and designing specific physics education process.

In this course, it is necessary to help students master scientific basis of defining tasks of teaching physics and the teaching approaches; apply modern teaching methods in teaching process of teachers. In addition, this course help students enhance skill of working in teams.

31331544 - Analysis and Development of High-school Physics

Credits 3

Program

This course helps students analyze the structure, curriculum, and representation of knowledge and problems in high school physics textbooks. This course also helps students develop skills of organizing teaching activities.

31331609 - Teaching Methods and Techniques (Physics)

Credits 3

This course gives students to explore a wide range of teaching methods and techniques which focus on active teaching-learning and learner-center approaches. In addition, this course facilitate students applying teaching methods and techniques to teaching Physics. Additionally, this course helps students enhance skill of using IT applications.

31331745 – High-school Physics Experiment

Credits 3

The course provides to students theoretical and practical knowledge of usage of experimental equipment, that have been equipped in high school. As a results, student can teach the physics knowledge in multiple ways: theory and experiment.

In addition, this course helps students enhance skills of designing and conducting performance and practical experiments

31321354 - Assessment in Teaching Physics

Credits 2

This course provides students with the fundamentals of assessment in education and teaching. It also helps student develop skills of assessing students. This course includes:

- Fundamentals of assessment in teaching.
- Assessment of learning results: purpose and function, classification, process, techniques, requirements.
- Assessment of educational results: characteristics and contents, Methods and techniques.

31331794 - Physics Teaching Practice (at UED)

Credits 3

This course helps student enhance skills of organizing teaching activities in Physics. This course includes:

- Practice basic teaching skills such as board writing and drawing, questioning ...
- Make lesson plan in Physics;
- Practice teaching;
- Make simple physics experiments for teaching.

30331845 - Internship 1

Credits 3

The internship 1 is aimed to provide students a whole view about their career prospect. This internship helps student enhance skills of organizing teaching and educational activities. The main tasks of students during this internship are:

- Do an educational science research;
- Learn about and initially practice class management and teaching activities at secondary and high schools;
- Write personal reports.

30331846 - Internship 2

Credits 3

The internship 2 is aimed to help students effectively use skills of organizing teaching and educational activities. The main tasks of students during this internship are:

- Study on the educational reality at secondary and high schools;
- Organize educational and teaching activities at secondary and high schools;
- Write a personal reports.

3.5.5. Selective Courses

33121252 - Sex education

Credits 2

The course provides 10 lessons designed on the CDROM, which in turn teaches about sexual rights and sexuality including age-related psychological issues, love, sexuality, pregnancy, sexual transmission risk, protection against sexual abuse, sexual harassment, gender awareness and gender-specific rights, specifically through sexual acts and ultimately to guide students to make their own decisions in the face of common situations in college age.

32021373 – School Consulting Skills

Credits 2

This course introduces the nature of school counseling; basic knowledge, skills and ethical principles of counselors at high school; problems of students and schools need to be consulted; forms and procedures for school counseling;

This course provides basic skills and practical applications at high school for psychological support for students, parents and other teachers.

31321578 - *Methods of Solving High-School Physics Problems* Credits 2

This course introduces principles of teaching student how to solve a physics problem at high school such as choosing teaching materials and methods, classifying physics problems, defining steps of solving physics problems, solving problems in high school physics textbooks

31321887 – *IT applications in Physics* Credits 2

This course guides students how to use application software for coding the following tasks:

- + Draw 2-D, 3-D graphs with different types as required by each case
- + Process experimental data with a large number of data points.
- + Smooth and fit the experimental curve

In addition, students have additional conditions to practice thier teamwork and presentation skills in this course.

31321928 – *IT Applications in Teaching Physics* Credits 2

This course introduces and instructs students using some softwares in teaching Physics. The softwares simulate Physics phenomena and experiments which help learner deeply understand in Physics. In addition, this course helps students enhance skill of using IT applications.

31321197 – *Engineering Electricity* Credits 2

The course consists of three chapters to provide students with the knowledge of:

- + Basic concepts of electric circuits, sinusoidal currents and circuit analysis methods.
- + Three-phase circuits and three-phase asymmetric and asymmetric circuits
- + Three-phase transformers and motors.

This course also help students develop skills of designing and conducting experiments about three-phase circuits and motors.

31331199 - *Basic Electronics* Credits 3

This course introduces to students basic knowledge in Electronics:

- + Op amps and op amp circuits;
- + PN junction physics; PN, Schottky, and Zener diodes and circuits;
- + Circuits with both op amps and diodes;
- + MOSFETS as switches and amplifiers;
- + Circuits with MOSFETS; BJT physics; BJTs as switches and amplifiers;

31321860 - Introduction to Physics Teacher Education **Credits 2**

The course introduces the most general aspects of Physics teacher education program skills and competences required of a physics teacher at high schools. In addition, this course helps students initially develop skill of communication.

31321860 - English for Physics **Credits 2**

This course aims to help students understand physical and mathematical terminologies in English and improve skills of using English language in study and research including reading physical science books, writing short paragraphs to express concepts, laws of Physics, communicate in a few simple work contexts.

31321052 - Atomic Spectra and Structure **Credits 2**

This course provides students with basic concepts and principles of atomic spectra structure and luminescence, including:

- Stationary states;
- The intensity of spectral lines;
- Stimulation and expansion of spectral lines;
- Energy level diagram and spectrum;
- Emission spectrum of atom.

31321769 - Optical Communications **Credits 2**

The course consists of 4 chapters to provide students with the knowledge of:

- Optical Fibre;
- Optical Sources;
- Optical Detectors;
- Optical Communication Systems.

This course also helps students enhance skill of communication.

31321753 - Equipment and Methods of Spectral Analysis **Credits 2**

The course consists of 5 chapters to provide students with the knowledge of equipment used for analyzing atomic spectra including sources, dispersion, detectors, and spectrophotometers and methods of spectral analysis. This course also helps students enhance skill of using IT applications.

31321981 - Nano Physics **Credits 2**

The course consists of three main contents: low-dimensional semiconductor, quantum kinetic equations, advanced material and their applications. The course consists of 6

chapters to provide students the knowledge of

- The structure, energy spectrum, and electron wave function in low dimensional semiconductor systems.
- Operator
- The method of quantum kinetic equation
- Advanced materials
- The applications of Advanced materials.

31321974 - Semiconductor Physics

Credits 2

The Semiconductor Physics preliminary examination will cover basic properties of semiconductors, physical principles and operational characteristics of semiconductor devices.

Physics and Properties of Semiconductors: crystal structure, energy bands, statistics, Fermi level, carrier concentration at thermal equilibrium, carrier transport phenomena, Hall effect.

P-N Junction: depletion region, diffusion, generation-recombination, current-voltage characteristics, junction breakdown, charge storage and transient behavior.

30361338 - Capstone Project

Credits 6

The capstone project aims to provide students with opportunities to participate in activities that will allow them to demonstrate the ability to apply the knowledge and skills they have gained over the years of training provided by the program. Projects may contain research content, design content or deep research in theory, experimental physics or teaching process. Students can propose the content of their thesis or choice from lecture's proposals.

The course is designed to ensure that students are able to apply, analyze, synthesize and evaluate the amount of information they receive, and in particular, the ability to communicate and impart knowledge as well as their understanding of the problem.

This course helps students enhance skills of self-study, research, using IT applications, communication in English. As a result, students can develop life-long learning ability.

PART 4. IMPLEMENTATION CONDITIONS

4.1. Facilities

Students in FP can use the common facilities provided by the UED, such as classrooms (traditional classrooms equipped with projectors and interactive classrooms), computer rooms, library, etc. Moreover, FP has 08 experimental rooms, of which 03 rooms are used for General Physics Experiment courses, 01 room is used for High School Physics Experiment course, 01 room is used for electronic experiments, and 03 rooms are used for research activities of students and lecturers. FP is also equipped with 01 seminar room, 02 learning consultation rooms. The seminar room is also used as FP's library, which has books related to Physics shared by lecturers and students to create a friendly and convenient self-study space. Annually, FP and UED make plans for step by step improving the facilities to meet the conditions for the implementation of teaching and learning activities.

4.2. Academic and support staff

FP currently has 24 academic and support staffs, including 11 PhD (02 associate professors), 10 masters, and 03 support staffs. The tasks of the academic and support staff are teaching and supporting courses belonging to core knowledge and professional competence in education clusters. The courses of general knowledge, foundation knowledge, and some courses related to pedagogics and psychology are taught by lecturers in Faculties of Mathematics, Information Technology, Biology & Environment, Chemistry, Psychology, and Political Education. Foreign language courses are taught by lecturers coming from University of Foreign Language Studies (a member of the UD).

4.3. Textbooks

Main textbooks of all courses in PTEP are available at the libraries of UED and FP.

Rector of UED

Dean of FP