



## Summary of the Program Information

### Doctor of Philosophy Program in Natural Resource Productivity Innovation and Management (Interdisciplinary Curriculum) New Program (2022)

**University:** University of Phayao

**Faculty:** Faculty of Agricultural and Natural Resources

#### Category 1: General Information

##### Course Code and Title:

**Code:** 0570

**Course title:** Doctor of Philosophy Program in Natural Resource Productivity Innovation and Management (Interdisciplinary Curriculum)

##### Total Number of Credits Required for the Entire Program:

Program Type 1.1: A minimum of 48 (6) credits, the duration of study should not exceed 6 years.

Program Type 1.2: A minimum of 72 (6) credits, the duration of study should not exceed 8 years.

Program Type 2.1: A minimum of 48 (3) credits, the duration of study should not exceed 6 years.

Program Type 2.2: A minimum of 72 (3) credits, the duration of study should not exceed 8 years.

*Note: The number in parentheses indicates that these credits are not counted*

##### Language of Instruction

The language of instruction is a hybrid system (Thai and English languages).

## Category 2: Specific Information of the Program

### Philosophy of the Program

The innovation in natural resource productivity and management involves the application of contemporary technology in conjunction with agricultural sciences to maximize benefits in production and resource management. This approach leads to the creation of innovations and new knowledge using interdisciplinary insights to address issues and promote the sustainable development of communities, society, and the environment.

### Qualifications for Applicants

1. Must hold a bachelor's degree or equivalent with excellent academic performance, or a master's degree or equivalent, and meet the English language proficiency requirements set by the Commission on Higher Education or in accordance with relevant university regulations, announcements, and practices.

2. Must have never been sentenced to imprisonment by a final court decision, except for offenses committed through negligence or minor offenses.

3. Must have never been expelled or dismissed from any educational institution due to misconduct.

4. Must be in good physical health that does not impede studies, in accordance with the University of Phayao regulations on graduate studies, 2018.

5. Must possess other qualifications as specified by the university.

### Schedule for Course Delivery:

**First Semester:** June – October

**Second Semester:** October – February

### Admission Process:

Selection is conducted in accordance with the announcement for entrance examinations for higher education institutions by the Ministry of Education or the regulations for graduate admissions of University of Phayao, with the following additional qualifications:

**Program Type 1.1:** Applicants must have completed a Master's degree or its equivalent from a higher education institution recognized by the Office of the Higher Education Commission.

**Program Type 1.2:** Applicants must have completed a Bachelor's degree or its equivalent from a higher education institution recognized by the Office of the Higher Education Commission, with a strong academic performance.

**Program Type 2.1:** Applicants must have completed a Master's degree or its equivalent from a higher education institution recognized by the Office of the Higher Education Commission.

**Program Type 2.2:** Applicants must have completed a Bachelor's degree or its equivalent from a higher education institution recognized by the Office of the Higher Education Commission, with a strong academic performance.

**Program Structure:**

The program structure is divided into categories of courses that align with the standards set by the Ministry of Higher Education, Science, Research, and Innovation as follows:

Course Category	New Program (2022)			
	Type 1.1	Type 1.2	Type 2.1	Type 2.2
<b>1. Course Credits</b>			12	24
Specialized Courses			12	24
1.1 Required Courses			6	6
1.2 Elective Courses			6	18
<b>2. Dissertation</b>	<b>48</b>	<b>72</b>	<b>36</b>	<b>48</b>
<b>3. Non-Credit Required Courses</b>	<b>(6)</b>	<b>(6)</b>	<b>(3)</b>	<b>(3)</b>
<b>Total credits</b>	<b>48(6)</b>	<b>72(6)</b>	<b>48(3)</b>	<b>72(3)</b>

*Note: For graduate students, English proficiency testing must comply with the Phayao University Announcement on English Language Proficiency for Graduate Studies, 2019.*

## Courses in the Curriculum

### Type 1.1 Total 48 Credits

	<b>1) Dissertation</b>	<b>48 Credits</b>
215892	Dissertation	48 Credits
	<b>2) Non-Credit Required Courses</b>	<b>6 Credits</b>
215811	Advanced Science and Technology Research Methodology	3(2-3-5)
215881	Seminar I	1(0-3-2)
215882	Seminar II	1(0-3-2)
215883	Seminar III	1(0-3-2)

### Type 1.2 Total 72 Credits

	<b>1) Dissertation</b>	<b>72 Credits</b>
215893	Dissertation	72 Credits
	<b>2) Non-Credit Required Courses</b>	<b>6 Credits</b>
215811	Advanced Science and Technology Research Methodology	3(2-3-5)
215881	Seminar I	1(0-3-2)
215882	Seminar II	1(0-3-2)
215883	Seminar III	1(0-3-2)

**Type 2.1 Total 48 Credits****1) Specialized Courses****A minimum of 12 credits****Required Courses****6 Credits**

215811	Advanced Science and Technology Research Methodology	3(2-3-5)
215812	Innovation in Productivity and Modern Natural Resources Management	3(2-3-6)

**Elective Courses****A minimum of 6 credits**

Students are required to choose from the following courses:

**Group of Courses: Integration of Innovation in Natural Resource Productivity**

215821	Innovative Safe Livestock Production	3(2-3-6)
215822	Innovation in Sustainable Aquaculture Production	3(2-3-6)
215823	Innovation and Advanced Plant Production	3(2-3-6)
215824	Future Food Innovation	3(2-3-6)
215825	Selected Topics in Productivity Innovation and Natural Resource Management	3(2-3-6)

**Group of Courses: Integration of Innovation in Natural Resource Management**

215831	Modern Livestock Management Technology	3(2-3-6)
215832	Advanced Aquatic Resources Management Technology	3(2-3-6)
215833	Smart Agriculture System for Plants Production Management	3(2-3-6)
215834	Advanced Food Processing Management	3(2-2-5)
215835	Management and Application Molecular Biology for Biodiversity	3(2-3-6)

**2) Dissertation****36 Credits**

215891	Dissertation	36 Credits
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**3) Non-Credit Required Courses****3 Credits**

215881	Seminar I	1(0-3-2)
215882	Seminar II	1(0-3-2)
215883	Seminar III	1(0-3-2)

**Type 2.2 Total 72 Credits****1) Specialized Courses****A minimum of 24 Credits****Required Courses****6 Credits**

215811	Advanced Science and Technology Research Methodology	3(2-3-5)
215812	Innovation in Productivity and Modern Natural Resources Management	3(2-3-6)

**Elective Courses****A minimum of 18 Credits**

Students are required to choose from the following courses:

**Group of Courses: Integration of Innovation in Natural Resource Productivity**

215821	Innovative Safe Livestock Production	3(2-3-6)
215822	Innovation in Sustainable Aquaculture Production	3(2-3-6)
215823	Innovation and Advanced Plant Production	3(2-3-6)
215824	Future Food Innovation	3(2-3-6)
215825	Selected Topics in Productivity Innovation and Natural Resource Management	3(2-3-6)

**Group of Courses: Integration of Innovation in Natural Resource Management**

215831	Modern Livestock Management Technology	3(2-3-6)
215832	Advanced Aquatic Resources Management Technology	3(2-3-6)
215833	Smart Agriculture System for Plants Production Management	3(2-3-6)
215834	Advanced Food Processing Management	3(2-2-5)
215835	Management and Application Molecular Biology for Biodiversity	3(2-3-6)

**2) Dissertation****48 Credits**

215892	Dissertation	48 Credits
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**3) Non-Credit Required Courses****3 Credits**

215881	Seminar I	1(0-3-2)
215882	Seminar II	1(0-3-2)
215883	Seminar III	1(0-3-2)

## Study plans

## Type 1.1

## Year 1

## First Semester

215811	Advanced Science and Technology Research Methodology	3(2-3-5) (Credits not counted)
215892	Dissertation	6 หน่วยกิต
	<b>Total</b>	<b>6 (3) Credits</b>

## Second Semester

215881	Seminar I	1(0-3-2) (Credits not counted)
215892	Dissertation	6 Credits
	<b>Total</b>	<b>6 (1) Credits</b>

## Year 2

## First Semester

215882	Seminar II	1(0-3-2) (Credits not counted)
215892	Dissertation	6 credits
	<b>Total</b>	<b>6 (1) Credits</b>

## Second Semester

215883	Seminar III	1(0-3-2) (Credits not counted)
215892	Dissertation	6 Credits
	<b>Total</b>	<b>6(1) Credits</b>

## Year 3

## First Semester

215892	Dissertation	12 Credits
	<b>Total</b>	<b>12 Credits</b>

## Second Semester

215892	Dissertation	12 Credits
	<b>Total</b>	<b>12 Credits</b>

## Type 1.2

## Year 1

## First Semester

215811	Advanced Science and Technology Research Methodology	3(2-3-5) (Credits not counted)
215893	Dissertation	6 Credits
	<b>Total</b>	<b>6 (3) Credits</b>

## Second Semester

215881	Seminar I	1(0-3-2) (Credits not counted)
215893	Dissertation	6 Credits
	<b>Total</b>	<b>6 (1) Credits</b>



## Year 2

## First Semester

215882	Seminar II	1(0-3-2)
		(Credits not counted)
215893	Dissertation	6 Credits
	<b>Total</b>	<b>6 (1) Credits</b>

## Second Semester

215883	Seminar III	1(0-3-2)
		(Credits not counted)
215893	Dissertation	6 Credits
	<b>Total</b>	<b>6(1) Credits</b>

## Year 3

## First Semester

215893	Dissertation	6 Credits
	<b>Total</b>	<b>6 Credits</b>

## Second Semester

215893	Dissertation	12 Credits
	<b>Total</b>	<b>12 Credits</b>

## Year 4

## First Semester

215893	Dissertation	12 Credits
	<b>Total</b>	<b>12 Credits</b>

## Second Semester

215893	Dissertation	6 Credits
	<b>Total</b>	<b>6 Credits</b>

## Year 5

## First Semester

215893	Dissertation	6 Credits
	<b>รวม</b>	<b>6 Credits</b>

## Second Semester

215893	Dissertation	6 Credits
	<b>รวม</b>	<b>6 Credits</b>

**Type 2.1****Year 1****First Semester**

215811	Advanced Science and Technology Research Methodology	3(2-3-5)
215891	Dissertation	6 Credits
	<b>Total</b>	<b>9 Credits</b>

**Second Semester**

215812	Innovation in Productivity and Modern Natural Resources Management	3(2-3-5)
215881	Seminar I	1(0-3-2) (Credits not counted)
215891	Dissertation	6 หน่วยกิต
	<b>Total</b>	<b>9(1) Credits</b>

**Year 2****First Semester**

215xxx	Major Elective	3(X-X-X)
215882	Seminar II	1(0-3-2) (Credits not counted)
215891	Dissertation	6 Credits
	<b>Total</b>	<b>9(1) Credits</b>

**Second Semester**

215883	Seminar III	1(0-3-2) (Credits not counted)
215891	Dissertation	6 Credits
215xxx	Major Elective	3(X-X-X)
	<b>Total</b>	<b>9(1) Credits</b>

## Year 3

## First Semester

215891	Dissertation	6 Credits
	<b>Total</b>	<b>6 Credits</b>

## Second Semester

215891	Dissertation	6 Credits
	<b>Total</b>	<b>6 Credits</b>

## Type 2.2

## Year 1

## First Semester

215811	Advanced Science and Technology Research Methodology	3(2-3-5)
215892	Dissertation	6 Credits
	<b>Total</b>	<b>9 Credits</b>

## Second Semester

215812	Innovation in Productivity and Modern Natural Resources Management	3(2-3-5)
215881	Seminar I	1(0-3-2)
		(Credits not counted)
215892	Dissertation	6 Credits
	<b>Total</b>	<b>9(1) Credits</b>

## Year 2

## First Semester

215882	Seminar II	1(0-3-2)
		(Credits not counted)
215892	Dissertation	6(X-X-X)
	<b>Total</b>	<b>6(1) Credits</b>

## Second Semester

215883	Seminar III	1(0-3-2)
		(Credits not counted)
215892	Dissertation	6 Credits
215xxx	Major Elective	3(X-X-X)
	<b>Total</b>	<b>9(1) Credits</b>

## Year 3

## First Semester

215892	Dissertation	6 Credits
215xxx	Major Elective	3(X-X-X)
	<b>Total</b>	<b>9 Credits</b>

## Second Semester

215892	Dissertation	6 Credits
215xxx	Major Elective	3(X-X-X)
	<b>Total</b>	<b>9 Credits</b>

## Year 4

## First Semester

215892	Dissertation	3 Credits
215xxx	Major Elective	3(X-X-X)
	<b>Total</b>	<b>6 Credits</b>

## Second Semester

215892	Dissertation	3 Credits
215xxx	Major Elective	3(X-X-X)
	<b>Total</b>	<b>6 Credits</b>

## Year 5

## First Semester

215892	Dissertation	3 Credits
215xxx	Major Elective	3(X-X-X)
	<b>Total</b>	<b>6 Credits</b>

## Second Semester

215892	Dissertation	3 Credits
	<b>Total</b>	<b>3 Credits</b>

## Course Descriptions

### **215811 Advance Research Methodology for Science and Technology 3(2-3-5)**

Importance of research in innovation in natural resource productivity and environmental management, research processes, causes and selection of research topics, literature reviews related to research issues, using information of research proposal, experimental design and wetted statistics data collection and data analysis using statistic computer program, presentation of results and interpretation, report writing for symposium presentation, publication of research article in scientific journals

*Note: For Study Plans 2.1 and 2.2, courses are taken for credit.*

*For Study Plans 1.1 and 1.2, courses are taken as non-credit.*

### **215812 Innovation in Productivity and Modern Natural Resources Management 3(2-3-6)**

Innovative designed thinking, productivities of plant, animals and fisheries, laws, logistics, administration and management of natural resources, writing a business plan, marketing, modern accounting, biotechnology, information data, healthy food, community, modern foundation economic management system

### **215821 Innovation in Safe Livestock Production 3(2-3-6)**

Application of DNA technology for animal genetic improvement, smart farming production concepts, beef cattle, swine, poultry biotechnology, information technology, IoT, wireless sensor technology, artificial Intelligence (AI), GPS system controls, agricultural machinery for cultivation, automatic care and harvesting, application artificial Intelligence (AI) in livestock farm, application technology and innovation, application of friendly environmental and suitable for development of local enterprise

**215822 Innovation in Sustainable Aquaculture Production****3(2-3-6)**

Application of DNA technology for aquatic animal genetic improvement, innovation of aquaculture, smart farming for aquaculture, application of IoT for aquaculture, high-quality aqua feed production, innovation of aquatic animal health management and water quality control, application of medicinal plants in aquaculture, using the appropriate technology to reduce costs and increase profits in aquaculture, future trend of new commercial aquatic animals

**215823 Innovation and Advanced Plant Production****3(2-3-6)**

Application of DNA technology for plant genetic improvement, plant production innovation, innovations to increase crops yield and products value added, water management innovation, fertilizer and plant nutrient management innovation, soilless culture technology, farm management technology, plant propagation technology, application of medicinal plants for agriculture, plant breeding technology, seed technology, phytosanitary management technology, postharvest technology and quality control, agricultural information technology

**215824 Future Food Innovation****3(2-3-6)**

Food future trends, novel food, functional food, medical food, organic food, novel food, alternative protein from insects, algae, plant and duckweed, synthetic food, probiotic fermented food, personalized nutrition, cultured meat, 3D-printed food, regulations and standards related to food innovation

**215825 Selected Topics in Natural Resource Productivity Innovation  
and Management****3(2-3-6)**

Selected topics in productivity and natural resource management at the doctoral degree level, topics could be changed for each semester

**215831 Modern Livestock Management Technology****3(2-3-6)**

Technology and innovation design and management system, traceability processing plant, animal products, transportation, modern marketing, community-friendly environmental management, application of geoinformatics in agricultural resources



**215832 Advanced Aquatic Resources Management Technology 3(2-3-6)**

Application and integrations of knowledge based on science, technology, society, economy, lifestyle, cultures in fisheries and aquatic resources, integration for fishery innovation development, sustainable increase of aquatic resources productions with environmental friendly and geo-sociology, integrated aquatic resources management, status on human aquatic resources utilization, appropriate application of technology for sustainable aquatic resources management, environmental assessment of aquatic resources

**215833 Smart Agriculture System for Plants Production Management 3(2-3-6)**

Smart agricultural technology, application of geoinformatics in agricultural resources, integrating pest management technology, modern plant nutritional management system, smart farming, precision agriculture, postharvest technology, standard and quality control of agricultural products for food safety, agricultural industry standards and specifications, quality control tracking and traceability system, communication, application of artificial intelligence

**215834 Advanced Food Processing Technology 3(2-2-5)**

Advance technology in thermal and non-thermal food processing, aseptic processing, microwave processing, radio frequency processing, infrared processing, ohmic heating, high-pressure processing, ultrasonic processing, ultraviolet and pulsed light processing, irradiation processing, membrane processing, ozone and acidic electrolyte water processing, hurdle technology, advanced food refrigeration technology

**215835 Management and Application Molecular biology for Biodiversity 3(2-3-6)**

Molecular evolution, gene sequencing technology, DNA markers for assessment of genetic diversity, metagenomics, phylogenic analysis, effects of invasive species on genetic diversity, preservation and utilization of biodiversity, microbiome, marker-assisted selection

**215881 Seminar I (Credits not counted) 1(0-3-2)**

Research study, analytical thinking, research articles or papers analysis, presentation in productivity innovation and natural resource management related to research topics

**215882 Seminar II****(Credits not counted) 1(0-3-2)**

Literature reviews, proposal presentation in productivity innovation and natural resource management

**215883 Seminar III****(Credits not counted) 1(0-3-2)**

Progress reports related to thesis topic, presentation in academic conferences

*\*\*\*Note: For Study Plans 1.2 and 2.2*

*\*\*\*Note: Students may use their work presented through oral presentations at external academic conferences to claim credit for one seminar course.*

**215891 Dissertation****36 Credits**

Constructing new Knowledge by systematic research methodology, problem solving and publishing productivity innovation, seeking knowledge related to research topics, combinations of different disciplines of sciences, engineering, information technology, administration and management of natural resources, agricultural sciences, analysis, building up of new knowledge and agricultural innovation by research process.

**215892 Dissertations****48 Credits**

Constructing new Knowledge by systematic research methodology, problem solving and publishing productivity innovation, seeking knowledge related to research topics, combinations of different disciplines of sciences, engineering, information technology, administration and management of natural resources, agricultural sciences, experimental design for problem solving, building up of new knowledge and agricultural innovation

**215893 Dissertation****72 Credits**

Constructing new Knowledge by systematic research methodology, problem solving and publishing productivity innovation, research conduction with creativeness, development of independent thinking and expression of opinion, combinations of different disciplines of sciences, engineering, information technology, administration and management of natural resources, agricultural sciences, to building up of new knowledge and agricultural innovation which reflects the understanding of research conducted.

**Graduation Requirements for the Program**

The graduation requirements for all four study plans are in accordance with the University of Phayao regulations on graduate studies, 2018, and the Ministry of Education's announcement on graduate program standards, 2015, as follows:

1. Pass the English language proficiency test according to the criteria and conditions set by the university.
2. The qualifying examination (QE) has been passed.
3. The final oral defense of the dissertation has been successfully passed, conducted by a committee appointed by the university. This committee must include an external expert as the chairperson
4. Prior to graduation, the dissertation or a portion of the dissertation must be published or **at least accepted for publication in a national or international journal of quality** as specified by the announcement of the Higher Education Commission or according to the University of Phayao's Regulations on Graduate Studies 2018, in no fewer than **two articles**, with the **student's name as the first author**.