

UNIVERSITY CURRICULUM

Name of program: WATER RESOURCES ENGINEERING

Level: UNDERGRADUATE

Major: WATER RESOURCES ENGINEERING

Major Code: 52 58 02 12

Type of training: Full time

1. Objective and Outcome standards:

1.1. Objectives

1.1.1. General Objectives

Training Water Resources engineers who have political qualities and good morality, knowledge and capacities to commensurate with the undergraduate level; have the health to meet the requirements of the industrialization and modernization of the country; Have a serious attitude, work independently and in teams, have the ability to cooperate and manage resources; Ability to adapt the diverse positions in the field of water resources in the training institutions, scientific and technological agencies, management agencies, state-owned enterprises as well as private enterprises; Adapt to the development of a knowledge-based society.

1.1.2. Specific Objectives

About professional degree: Have the basic specialized knowledge of water resources in both surface water and ground water. After graduation, students will not only get theories but also apply to the reality the knowledge of economics, markets and issues related to the law in conservation and sustainable use of water in agriculture, in the creative and active way. Students can have the ability to apply the knowledge to solve the issues of water use planning in agriculture; to self study, research and update the new knowledge and technologies such as computers, GIS, remote sensing, economic knowledges, management and foreign languages.

About the morality: Have the morality in working activities, right citizen attitudes.

About the working capacities: Students after graduation can choose the following solutions:

- Agencies of consultant, design, management and development of irrigating systems in agriculture.
- Design and development of irrigation systems in the river basins to develop and protect environmental resources.
- Analyzing, processing, integrating and storing the water resources and environmental information for evaluating the impacts on the river basins, public agencies, institutes and research centers, community and social management and development agencies.

1.2. Outcome standards

After finishing the program, students will get the knowledge, skills, Capacity of self control and responsibility as follows:

1.2.1. Knowledge

1.2.1.1. General Knowledge

+ Understanding and applying the knowledge in natural sciences such as Mathematics, Physics, Chemistry, Social Sciences and Humanities to solve the issues related to the water resources engineering.

+ Understanding, analyzing and evaluating the scientific knowledge system about : the basic principles of Marxism-Leninism ; Ho Chi Minh Ideology; guidelines of the Party and laws of the State; applying these scientific knowledge into the real life.

1.2.1.2. Major Knowledge

a. Having the advance theoretical knowledge in the field of water resources engineering:

+ Applying the knowledge in Hydraulics, Hydrology, Soil Mechanics, Descriptive Geometry and Engineering Drawing, Water Quality, Pedology, Oceanography, Water movement and solute transport in soil, Strength of Materials, Sinh thái đại cương in the researches on water resources.

+ Applying the knowledge in soils and soil properties, characteristics of water quality, processes of water and soil transport, ecological characteristics related to water, the knowledge of sea and oceans, moving rules and the distribution of water resources to describe, assess the characteristics and processes of water, soil, soil-water-plants, analyze water quality and calculate the water balance for the construction of water resources exploitation;

- + Understanding and analyzing the knowledge in reinforced concrete, building materials, structural mechanics, irrigation and transportation works to solve the structural works.

- + Applying the knowledge in the operational principles of electrical system, pumps, pump stations, water supplies and drainages to solve the problems of water exploitation, utilization and management.

- + Applying the knowledge about regulations, stages in measuring processes, mapping, RS images processing, GIS for mapping, developing and managing spatial database for water resources management.

- + Applying the knowledge in Watershed management, Irrigation, Drainage, Cultivation Science, Wetland, Groundwater, Paddy soil, Pedology to calculate the water the water demand, crops irrigation, surface water regulatory;

- + Applying the knowledge in water resources system models, hydrological models, hydraulic models, GIS application for water resources planning and management.

b. Understanding the technical and practical knowledge to solve the complicated tasks:

- + Applying the knowledge in the designing principles of electrical systems, pumps, pump stations, water supplies and drainages to design water supply and drainage systems and propose solutions for exploitation, utilization and management of water resources.

- + Applying the knowledge in geodesy, cartography, remote sensing, GIS to establish maps, build and manage spatial database, data on water resources for water resources management in the locals and river basins.

- + Applying the knowledge in river basins management, Irrigation, Drainage, Cultivation Science, Wetland, Groundwater, Paddy soil, Pedology to propose solutions for specific areas, design the irrigation and drainage systems.

- + Applying the knowledge in water resources system models, hydrological models, hydraulic models, GIS application to develop water resources system models for water resources planning.

- + Applying the knowledge and science methods to solve the issues in water resources engineering.

c. Having the knowledge in management, legal and environmental protection related to water resources:

- + Applying the knowledge in agricultural meteorology, environmental ecology, water resources policies for planning, management, sustainable exploitation of water resources and environmental protection.

- + Applying the knowledge in the social issues for planning, management, sustainable exploitation of water resources and environmental protection.

1.2.2. Skills

- + Calculating the problems of water demand, planning and designing the systems of irrigation works, establishing database in water resources for water resources management.

- + Applying the knowledge in water resources, water resources law, land law, planning, preventing and mitigating risks in natural disasters and climate change, designing research projects and experiments, building projects of water resource management and utilization, solving water pollution to deal with the issues of water resources engineering.

- + Updating the knowledge and giving solutions for the new issues related to water resources engineering.

- + Updating the knowledge and information domestically and internationally and the issues raised in researches and application of water resources engineering; Analyzing, synthesizing and utilizing new achievements in sciences and technologies to solve the practical and abstract issues in water resources engineering.

- + Analyzing and synthesizing the ideas to develop plans for solving the issues related to planning, exploitation and management of water resources.

- + Solving the issues related to planning, exploitation and management of water resources in the mountainous areas, deltas and estuaries.

- + Understanding and applying the basic knowledge of information technology, the issues of working safety, environmental protection in utilizing information technology and media, and some basic issues related to the law in utilizing information technology; proficiency in using computer and some basic softwares like Word, Excel, Powerpoint; proficiency in using Autocad, GIS, Cropwat, Arcview, ArcGIS, etc for water resources engineering.

- + The minimum English level that students need to get is TOIC 400 and the equivalent. Students can understand simple conversations; understand main ideas in the social life. Students can take simple dialogues; express limited opinions on the cultural, social and deal with some common professional situations. Students can read and understand the popular documents related

to the familiar cultural and social issues in English; exchange the professional knowledge in land management, water resources, soil science and fertilizers.

1.2.3. Capacity of self control and responsibility

- + Proposing solutions and improving to solve the issues of water resources engineering.
- + Transferring, supervising, explaining the professional knowledge in water resources for learners, from that raising the abilities for public activities, group activities in water resources engineering.
- + Evaluation and assignment of professional tasks based on the individual capacities, proposal solutions to improve the work efficiencies.
- + Giving conclusions, decisions to solve the issues in water resources engineering.
- + Having abilities to work independently, implement works and solve the internal problems, inspect and monitor people, plan works; work in groups, listen to and respect the other ideas; Interacting to plan and solve the raised problems in soil science.
- + Active, positive, honest, having disciplines and responsibilities in doing researches, professional activities in water resources engineering.
- + Believing in Marxism and Lennism, Ho Chi Minh Ideology, at the same time, doing well the citizen's duties toward the Party's line and the State's law.
- + Self-studying, accumulation of experience to improve the degree in soil science for water resources engineering.

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Training period: 5 years

Total volume of knowledge: 159 credits (Exception of physical education and military education)

Candidates:

Pupils who graduated high schools or supplement high school, passed the entrance examination by the Ministry of Education and Training

Training process, conditions for graduation:

According to the decision No 2397QD-HVN, 13rd of August 2015 about Regulations for teaching and studying full time undergraduate under the credit system of the Director of Vietnam National University of Agriculture.

Grading system: 10 then converts to 4

Contents (names and volumes of courses)

| No | Code | Vietnamese name | English name | Number of Credits | Previous Course | Compulsory | Selective | Knowledge | No | Code |
|------------------------------|---------|--|---|-------------------|-----------------|------------|------------------------------------|-----------|----------|---------|
| TOTAL GENERAL COURSES | | | | 40 | | | | 40 | 0 | |
| 1 | ML01001 | Những nguyên lý cơ bản CN Mác-Lênin 1 | (Principle of Marxism and leninsm 1) | 2 | 2 | 0 | | x | | General |
| 2 | ML01002 | Những nguyên lý cơ bản CN Mác-Lênin 2 | (Principle of Marxism and leninsm 2) | 3 | 3 | 0 | Principle of Marxism and leninsm 1 | x | | |
| 3 | ML01004 | Đường lối cách mạng của Đảng cộng sản Việt Nam | Revolutionary guideline of Vietnamese Communist Party | 3 | 3 | 0 | Ho Chi Minh Ideology | x | | |

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|---------------------------------|----------|-----------------------------------|---|-----------|-----|-----|------------------------------------|-------|----------|
| 4 | ML01005 | Tư tưởng HCM | Ho Chi Minh Ideology | 2 | 2 | 0 | Principle of Marxism and leninsm 2 | x | |
| 5 | SN01032 | Tiếng Anh 1 | English 1 | 3 | 3 | 0 | English 0 | x | |
| 6 | SN01033 | Tiếng Anh 2 | English 2 | 3 | 3 | 0 | English 1 | x | |
| 7 | TH01004 | Giải tích 1 | Analyse 1 | 3 | 3 | 0 | | x | |
| 8 | TH01005 | Giải tích 2 | Analyse 2 | 4 | 4 | 0 | Analyse 1 | x | |
| 9 | TH01007 | Xác suất thống kê | Probability and Statistics | 3 | 3 | 0 | Analyse 1 | x | |
| 10 | TH01002 | Vật lý đại cương A1 | General physics A1 | 3 | 2 | 1 | | x | |
| 11 | CD02104 | Cơ học lý thuyết 1 | Theoretical mechanics 1 | 3 | 3 | 0 | | x | |
| 12 | MT01001 | Hóa đại cương | Fundamentals of Chemistry | 2 | 1.5 | 0.5 | | x | |
| 13 | MT01004 | Hóa phân tích | Analytical Chemistry | 2 | 1.5 | 0.5 | | x | |
| 14 | ML01009 | Pháp luật đại cương | Introduction to laws | 2 | 2 | 0 | | x | |
| 15 | MT02033 | Vi sinh vật đại cương | Basic Microbiology | 2 | 1.5 | 0.5 | | x | |
| TỔNG SỐ PHẦN CƠ SỞ NGÀNH | | | | 35 | | | | 31/35 | 4/3 5 |
| 16 | CD 03219 | Thủy lực | Hydraulics | 3 | 2 | 1 | Theoretical mechanics 1 | x | |
| 17 | QL02001 | Nguyên lý thủy văn | Principles of hydrology | 3 | 3 | 0 | | x | |
| 18 | QL02002 | Thủy văn công trình | Hydrology of engineers | 3 | 2 | 1 | | x | |
| 19 | CD02114 | Cơ học đất | Soil Mechanics | 3 | 3 | 0 | | x | |
| 20 | CD02132 | Hình học họa hình và vẽ kỹ thuật | Descriptive Geometry and Engineering Drawwing | 2 | 1.5 | 0.5 | | x | |
| 21 | QL02003 | Chất lượng nước | Water Quality | 2 | 1.5 | 0.5 | Analytical Chemistry | x | |
| 22 | QL02047 | Thổ nhưỡng | Pedology | 2 | 1.5 | 0.5 | Fundamentals of Chemistry | x | |
| 23 | QL03001 | Hải dương học | Oceanography | 3 | 3 | 0 | | x | |
| 24 | QL02004 | Chuyển vận nước và chất trong đất | Water movement and solute transport in soil | 3 | 2 | 1 | Pedology; Hydraulic s | x | |
| 25 | CD02126 | Sức bền vật liệu 1 | Strength of Materials 1 | 3 | 3 | 0 | Theoretical mechanics 1 | x | |

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|----------------------------------|---------|-------------------------------------|---|-----------|-----|-----|--|--------------|--------------|
| 26 | MT01016 | Sinh thái đại cương | Basic Ecology | 2 | 2 | 0 | | x | |
| 27 | NH02005 | Phương pháp thí nghiệm | Experimental Methods | 2 | 1.5 | 0.5 | Probability and Statistics | x | |
| 28 | MT01006 | Khí tượng nông nghiệp | Agrometeorology | 2 | 1.5 | 0.5 | General physics A1 | | x |
| 29 | MT01008 | Sinh thái môi trường | Ecology and Environment | 2 | 2 | 0 | | | x |
| 30 | TH02009 | Phương pháp tính | Numerical methods | 3 | 2 | 1 | Analyse 1 | | x |
| 31 | NH02019 | Cây trồng đại cương | General Introduction of Crop | 2 | 1.5 | 0.5 | | | x |
| TỔNG SỐ PHẦN CHUYÊN NGÀNH | | | | 72 | | | | 54/72 | 18/72 |
| 32 | QL03002 | Nguyên lý thiết kế dự án | Principles of project design | 2 | 1.5 | 0.5 | | x | |
| 33 | CD02501 | Vật liệu xây dựng | Engineering building Materials | 2 | 2 | 0 | | x | |
| 34 | CD02117 | Bê tông cốt thép | Reinforced Concrete | 3 | 3 | 0 | Engineering building Materials | x | |
| 35 | QL03003 | Cơ học kết cấu | Structural Mechanics | 3 | 2 | 1 | | x | |
| 36 | KT03057 | Kinh tế tài nguyên nước | Water Resource Economics | 2 | 1.5 | 0.5 | | x | |
| 37 | CD03103 | Công trình thủy lợi và giao thông | Irrigation and Traffic structures design | 2 | 1.5 | 0.5 | | x | |
| 38 | QL02030 | Trắc địa | Geodesy | 3 | 2 | 1 | | x | |
| 39 | CD02611 | Kỹ thuật điện | Electric Engineering | 2 | 2 | 0 | | x | |
| 40 | QL03004 | Máy bơm và trạm bơm | Pump and Pumping Station | 3 | 3 | 0 | Irrigation and Traffic structures design | x | |
| 41 | QL02019 | Hệ thống thông tin địa lý | Geographical Information Systems | 2 | 2 | 0 | | x | |
| 42 | QI02020 | Thực hành hệ thống thông tin địa lý | Practice Geographical Information Systems | 1 | 0 | 1 | Geographical Information Systems | x | |
| 43 | QL3056 | Quản lý lưu vực | Watershed management | 2 | 1.5 | 0.5 | Principles of hydrology | x | |
| 44 | QL03015 | Đất dốc và xói mòn | Sloping land and soil erosion | 2 | 2 | 0 | | x | |
| 45 | QL03035 | Quy hoạch phát triển nông thôn | Rural Development Planning | 2 | 1.5 | 0.5 | | x | |

Major

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| 46 | NH02030 | Canh tác học | Cultivation Science | 2 | 1.5 | 0.5 | | x | |
| 47 | QL03005 | Tưới nước | Irrigation | 3 | 2 | 1 | | x | |
| 48 | QL03006 | Tiêu nước | Drainage | 2 | 1.5 | 0.5 | | x | |
| 49 | QL03007 | Phân tích hệ thống và ứng dụng trong quản lý TNN | System analysis and applications water resources | 2 | 2 | 0 | | x | |
| 50 | QL03008 | Nguyên lý quản lý tài nguyên nước | Principles of water Resources Management | 2 | 2 | 0 | | x | |
| 51 | QL03009 | Mô hình hệ thống tài nguyên nước | Modeling of water Resources Systems | 3 | 2 | 1 | | x | |
| 52 | QL03010 | Cấp thoát nước nông thôn | Rural water supply and sanitation | 2 | 2 | 0 | Irrigation; Drainage | x | |
| 53 | QL03011 | Thiết kế hệ thống tưới, tiêu | Irrigation and Draiage Systems Design | 3 | 2 | 1 | Irrigation; Drainage | x | |
| 54 | QL03012 | Kỹ thuật tài nguyên nước | Water Resources Engineering | 2 | 2 | 0 | | x | |
| 55 | SN03054 | Tiếng anh chuyên ngành | English for Land Management | 2 | 2 | | English 2 | x | |
| 56 | QL03055 | Đất ngập nước | Wetland | 2 | 1.5 | 0.5 | Pedology | | x |
| 57 | QL02028 | Địa chất công trình | Construction Geology | 2 | 1.5 | 0.5 | | | x |
| 58 | QL03013 | Đập nước và công trình thủy điện | Dam and Hydropower Structures | 2 | 2 | 0 | Hydraulic s | | x |
| 59 | QL03049 | Hình thái và chỉnh trị sông ngòi | Morphology and regulating rivers | 2 | 2 | 0 | Principles of hydrology | | x |
| 60 | QL01012 | Bản đồ địa hình | Topographical Map | 2 | 1.5 | 0.5 | | | x |
| 61 | QL03051 | Tài nguyên nước dưới đất | Groundwater | 3 | 3 | 0 | Principles of hydrology | | x |
| 62 | QL03054 | Mô hình thủy văn | Hydrological modelling | 2 | 2 | 0 | Principles of hydrology | | x |
| 63 | QL02029 | Viễn Thám | Remote Sensing | 2 | 1.5 | 0.5 | | | x |
| 64 | QL03058 | Ứng dụng GIS trong quản lý nguồn nước | GIS application in water resources management | 2 | 1 | 1 | Geographi cal Information Systems | | x |
| 65 | QL03059 | Quản lý và kiểm soát chất lượng nước | Water quality management and control | 3 | 2 | 1 | Water Quality | | x |
| 66 | QL03060 | Chính sách tài nguyên nước | Water Resources Policy | 2 | 2 | 0 | | | x |
| 67 | QL03020 | Đất lúa nước | Paddy soil | 2 | 1.5 | 0.5 | | | x |
| 68 | NH03064 | Hệ thống nông nghiệp | Agricultural Systems | 2 | 1.5 | 0.5 | | | x |

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|----|----------------|------------------------------|---|-----------|----------|-----------|--|-----------|---|--|
| 69 | MT03004 | Đánh giá tác động môi trường | Environmental Impact assessments | 2 | 2 | 0 | | | x | |
| 70 | QL04005 | Thực tập nghề nghiệp | Fieldtrips | 2 | 0 | 2 | | 2 | | |
| 71 | QL04999 | Đồ án tốt nghiệp | Thesis in Water Resouces Engineering | 10 | 0 | 10 | | 10 | | |