

UNDERGRADUATE COURSE DESCRIPTIONS- Fisheries:

- 3716101 General Botany 2+1 Cr.**
Plant physiology, anatomy of stem, root, leaf and flower, Plant morphology, taxonomy of flowering plants, description of major families.
- 3712101 Zoology 2+1Cr.**
Selected aspects of classification, phylogeny, morphology, development, physiology and ecology of animals.
- 3710140 Genetics 2+1Cr.**
Basic cell structure, chromosomes, gene duplication, mutation, anoploidy, polyploid, genetic coding, protein coding, quantitative genetic.
- 3716200 Meteorology and Climatology 2+1Cr.**
Radiation and radiation balance, air and soil temperature, air pressure, wind and general circulation, evapotranspiration, atmospheric humidity, condensation and atmospheric precipitation, climatic classifications.
Prerequisite: General Physics 2010118, Physics Lab. 2010119.
- 3712200 General Ecology 3 Cr.**
Scope of ecology, Principles and concepts pertaining to ecosystem, energy flow and transformation, biogeochemical cycles and limiting factors, Organization at the community and population levels, Biome, human and agricultural ecology.
- 3710241 General Biochemistry 3Cr.**
Relationship between biochemistry and agricultural and fisheries science, Chemical composition of organisms, biochemistry of food, biochemistry of carbohydrates, lipids, proteins, nucleic acid, enzymes, vitamins and hormones, Metabolism.
Prerequisite: Organic chemistry 2112229
- 3712203 General Ichthyology 2+1Cr.**
Basic information about fishes, information on life history, morphology, and anatomy of all fishes.
Prerequisite : Zoology 3712101.
- 3712202 General Hydrobiology 2+1Cr.**
Physicochemical condition of aquatic animal life, Plankton, nektons, benthos, periphyton, neuston and pleuston and Food chain in aquatic environment.
Prerequisite: Zoology 3712101
- 3710343 Experimental Design 2+1Cr.**
Definitions, experimental units, experimental errors, systematic design, Factorial design, square latine plots.
- 3716201 General Hydrology 2+1Cr.**
Introduction and history of Hydrology, Water cycle, Measurement of rainfall, Statistical analysis of rainfall.
Prerequisite:Meteorology & Climatology 3716200.
- 3712303 Principles of Aquatic Animals Nutrition 2+1Cr.**
Importance of nutrition in aquaculture, Economic importance of aquatic animals, Feed conversion ratio, Protein production efficiency,..., Introduction and classification of nutrients (proteins, carbohydrates, lipids, minerals and vitamin) and their function, digestion, absorption and Energy metabolism.
Prerequisite: General Biochemistry 3710241.
- 3710340 Technical Drawings 1+1Cr.**
Introduction, geometrical relations in drawings, drawing papers, line types, size and numbers, isometric, dimetric and trimetric drawings.
- 3712429 Principles of Fish Breeding and Cultivation 2+1Cr.**
Introduction to fish biology, Types of reproduction in fish, Fecundity, Maturation and hormones, Migration and reproduction, Hormone injection in artificial propagation, Culture systems (extensive, semi-intensive and intensive).
Prerequisite: General Ichthyology 3712203.

Department of Natural Resources

- 3714306 Environmental Evaluation** 1+1Cr.
Land classification, Geographical Information System and satellite images in regional programming.
Prerequisite: Introduction to environment 3714102.
- 3712340 Animal Physiology** 1+1Cr.
Energy metabolism, Physiology of respiration, Physiology of blood, Homeostasis, Reproduction and migration physiology.
Prerequisite: Zoology 3712101
- 3712204 Hydrochemistry** 1+1Cr.
Physicochemical characteristics of water, Characteristics of underground waters, Gases in water and their importance in aquaculture, Toxic compounds in water and...
Prerequisite: General Chemistry 2110103.
- 3710345 Economy of Natural Resources** 2 Cr.
The economic activity as a science; value theory and its origin; capital; economic transactions agents, approaches, commodity; and the agents operations; production dependent, cost marketing; GNP; currency function and planning.
- 3712453 Breeding and Cultivation of warm water fishes** 2+1Cr.
Principles and procedures for culture of important warmwater fish, emphasis will be placed on species used for food and restocking water bodies in Iran, management strategies. Laboratory and field trips included.
Prerequisite: Principles of Fish Breeding and Cultivation, 3712429.
- 3712305 Hydro technique and Pond Design** 1+1Cr.
Principles of site selection and pond design, topographical condition and soil structure, classification of ponds, installation, hydrotechnical and hydrological consideration in pond construction, field work included.
- 3712452 Breeding and Cultivation of Aquatic Organisms** 2+1 Cr.
Identification and morphology of commonly cultured prawn, breeding and cultivation, hatchery and farm operation, nutrition of prawn, principles and procedures for culture of edible bivalve mollusks. Environmental requirements, laboratory and field trips included.
Prerequisite: Fish Breeding and Cultivation 37304
- 3712450 Limnology** 2+1 Cr.
Physical and chemical features of inland waters and their biological communities, zonation of lotic and lentic waters, Dissolved gases, organic and inorganic soluble substances, nutrient cycling and food chain dynamic in freshwater ecosystem.
Prerequisite: General Hydrobiology 3712202
- 3712451 Marine Ecology** 3 Cr.
Characteristics of marine environment, nature and global distribution of marine organisms, productivity at sea, energetics of marine ecosystems. Zonation at sea, marine communities, sea shores, estuaries, human exploitation of marine ecosystems.
Prerequisite: Ecology 37103.
- 3712449 Fishing Methods** 2+Cr.
Identification of different ecological groups of fish at different aquatic ecosystems, fish migration, commercial and non-commercial fishes; fishing gears and methods, fishing vessels and policies, field trips.
Prerequisite: General Ichthyology 3712203
- 3712434 Diet formulation** 1+Cr.
History of diet formulation, feed ingredients, feed nomenclature, nutrients supplements (protein, energy, lipid, and carbohydrates), diets formulation, diet storage, ingredients and diet evaluation.
Prerequisite: Principles of Aquatic Animals Nutrition 3712303
- 3712435 Breeding and Cultivation of Cold Water Fishes.** 1+1 Cr.
Breeding and cultivation, hatchery and farm operation, and nutrition of rainbow trout and other cold water fishes. Environmental requirements. Laboratory and field trips included.

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Prerequisite: Principles of Fish Breeding and Cultivation, 3712429.

3712406 Systematic Ichthyology 2+1 Cr.

Fish biometry, morphological characteristics for identification and classification of fishes, special emphasis will be placed on fishes of the Persian Gulf, Oman Sea and inland waters. Practical work included.

Prerequisite : General Ichthyology 3712203.

3712431 Diseases and Parasites of Aquatic Animals 2+1 Cr.

The common diseases of both cold and warm water fishes, infective, non-infective and stress mediated concept of diseases in cultured fish and other aquatic animals, disease prevention, control and treatments, ecto and endo parasites. Laboratory work included.

Prerequisite: Fish Breeding and Cultivation 37304, General Ichthyology 3712203.

3712437 Breeding and Cultivation of Aquarium fishes 1+1Cr.

Introduction to aquaria, aquarium invertebrates and plants, classification of aquarium fishes, breeding and cultivation of aquarium fishes.

Prerequisite:Principles of Fish Breeding and Cultivation, 3712429.

3712423 Group Discussion 1 Cr.

Current topics in fisheries and related subjects.

Prerequisite: Adviser's approval,

3712456 Fisheries Rules & Management 2 Cr.

Introduction, social changes and the importance of rules and managements, role of rules in management, countries rule for fisheries.

Prerequisite: Economy of Natural Resources 3710345.

3712439 Principles of Breeding and Cultivation of Aquatic Animals 2 Cr.

Aims and methods of fish culture, principles and biotechniques of fish breeding, reproduction, hatchery operation and nutrition of hatchery reared fish, brood stock management, general characteristics of water for fish farming, integrated aquaculture.

Prerequisite: General Ichthyology 3712203.

3712438 Fishery Products Processing 2+1 Cr.

Aims and methods of fish culture, principles and biotechniques of fish breeding, reproduction, hatchery operation and nutrition of hatchery reared fish, brood stock management, general characteristics of water for fish farming, integrated aquaculture.

Prerequisite: General Ichthyology 3712203.

3712424 Project 3 Cr.

Students are required to design a research project and report to the results of their experiment to their supervisors.

Prerequisite: Consent of the supervisor.

UNDERGRADUATE COURSE DESCRIPTIONS for Environmental Sciences

- 3714213 Enviromental Law and Management 2 Cr.**
Introduction to thelaw science and the role ofEnvironmental rules, Historical development of Enviromental Laws, introduction to international Enviromental Law, United Nation's Role inEnviromental Law, The importance of Enviroment in UN, The bases of current laws (Islamic, Basic rules and Technical Regulations), TheRole of Enviromental Law in Environmental protection, Iranian Enviromental Management Organizations.
- 3710141 Geology 2+1 Cr.**
Introduction to the Earth, History of the Earth, Energy and Earth Resources, Igneous and Metamorphic Petrology, Geologic Field Methods, Stratigraphy and Sedimentology.
- 3716101 General Botany 2+1 Cr.**
Plant physiology, anatomy of stem, root, leaf and flower, Plant morphology, taxonomy of flowering plants, description of major families.
- 3716320 Academic English for Natural Resources 3Cr.**
Introduce the most important scientific terms of Range and Watershed management. Steps to translate and comprehensive English scientific terms.
- 3710245 Planimetry and Surveying 2+1 Cr.**
Introduces the instruments of surveying and their use in the art of determining the relative positions of points and lines on the earth's surface. Covers procedures for keeping proper field notes; causes of errors and mistakes in measurements; methods of determining accurate linear measurements; and procedures for determining distances and elevations by direct and indirect methods. Examines proper use of the transit, theodolite, compass, electronic total station, engineer's level, auto compensating level, alidade, scientific calculator, and global positioning systems.
- 3716200 Meteorology and Climatology 2+1 Cr.**
Radiation and radiation balance, air and soil temperature, air pressure, wind and general circulation, evapotranspiration, atmospheric humidity, condensation and atmospheric precipitation, climatic classifications.
Prerequisite: General Physics 2010118, Physics Lab. 2010119
- 3716205 Introduction to soil science 2+1 Cr.**
Soil texture, Soil structure, Soil genesis and classification, Soil biology, Soil fertility, soil chemistry and soil management.
- 3710246 Probability and Statistics 3Cr.**
Random variables and their distribution, Expectation, Special continuous model, Special discrete model, Dependence, Conditioning, Normal model
- 3710243 Computer acquaintance 1+1Cr.**
General knowledge of Hardware, Operation systems and windows, Internet and Email, MS Word, MS Excel, Ms PowerPoint
- 3716208 Cartography 1+1 Cr.**
Topographic map and aerial photograph, Physical characteristics of watersheds, preparation of topographical, hypsometrical, slope classification, Geographical aspects and drainage network maps, ordering network methods, planimetry and scaling maps, Image projection systems, map orientation.
- 3716206 Range Plants Identification I 1+1 Cr.**
Important range plants of Gramineae and Papilionaceae species families, classification and their characteristics.

Department of Natural Resources

- 3716210 Principles of Remote Sensing** 2+1 Cr.
Overview and history of remote sensing, the fundamentals of electromagnetic radiation, remote sensing systems: optical, thermal and active, image processing: enhancement, transformations, filtering, pre-processing, classification, applications of remote sensing in relation to soil, water, vegetation and man-made features, practical exercises using image processing softwares
- 3712200 General Ecology** 3 Cr.
Scope of ecology. Principles and concepts pertaining to ecosystem, energy flow and transformation, biogeochemical cycles and limiting factors. Organization at the community and population levels, Biome, human and agricultural ecology.
Prerequisite: Biology 37100
- 3714406 Park Management** 2 Cr.
fundamentals of planning a park; different kinds of parks, ecotourism and the role of parks in providing recreational requirements of people. Environmental Impact assessment of nature-based tourism applied ecological principles and their Implementation in nature conservation.
Prerequisite: National and Forest Parks 37333
- 3714313 Protected areas, National & Forest Parks** 2 Cr.
Concepts and history of national parks and protected areas, classification system of parks and protected areas, the role of parks in conservation of biodiversity and human environment; different kinds of parks, protected areas of Iran, IUCN laws and regulations in protected areas
- 3714403 Ornithology** 1+1Cr.
Identification of birds based on morphological and behavioral characteristics; migration of birds; classification of class Aves.
Prerequisite: Zoology 37101.
- 3714402 Fundamentals of Wildlife Management** 2 Cr.
General concepts in relation with wildlife management, ecology and dynamics of wildlife populations; carrying-capacity and maximum sustained yield, management for species conservation and for exploitation.
Prerequisite: Vertebrates Ecology 37312
- 3714404 Wildlife Management Techniques** 1+1Cr.
Capturing and marking wild animals; physiological indices in wildlife management; estimating the numbers of wildlife populations, habitat analysis and evaluation; habitat improvement techniques; wildlife damage and control techniques.
Prerequisite: Fundamental of Wildlife Management 37326
- 3714312 Vertebrates Ecology** 2 Cr.
Introduction to wildlife, adaptations and limitations of wildlife in relation to habitat requirements, wildlife food and nutrition, population dynamics.
Prerequisite: Ecology 37103.
- 3714212 Biology of Game Animals** 2+1 Cr.
Values of wildlife resources, classification of mammals and birds as the most important of games, identification and biology (habitat, migration, behavior, reproduction,...) of these two groups with emphasis on Iranian wildlife.
Prerequisite: Zoology 37101.
- 3714201 Human and Environment** 2 Cr.
Limits of growth, exponential growth, technology, population, food. pollution and natural resources and the limits of growth, basic demographic concept, human development.
Prerequisite: Environmental Sciences 37203
- 3714102 Environmental Sciences** 2+1 Cr.
Biosphere, biome, natural resources conservation, protection, diversity, climate change, UNEP, MAB.

Department of Natural Resources

- 3714306 Environmental Evaluation** 1+1Cr.
Introduction to land use and landscape ecology, general system theory, biocybernetic, holon concept, ecosystemology, tools, methods, model and application of Landscape ecology. **Prerequisite** : Environmental Sciences 37203.
- 3714428 Marine& lake Ecology** 2 Cr.
An introduction to Iranian lakes, Characteristics of marine& lake environment, nature and global distribution of marine organisms, productivity at sea, energetics of marine ecosystems. Zonation at lake, marine communities, sea shores, estuaries, human exploitation of marine ecosystems.
Prerequisite : Ecology 37103.
- 3716201 General Hydrology** 2+1 Cr.
Hydrologic cycle, rainfall measurement and analysis, evapotranspiration, Infiltration, water budget, surface water and sedimentation measurements.
Prerequisite: Meteorology and Climatology 3716200, Probability and Statistics 3710246
- 3710345 Natural Resources Economics** 2 Cr.
The natural resources economic activity as a science; value theory and its origin; capital; economic transactions agents, approaches, commodity; and the agents operations; production dependent, cost marketing; GNP; currency function and planning.
- 3716330 Water and Soil Conservation** 2+1 Cr.
Erosion: Worldwide and national classification, surface erosion mechanism, methods of measurement and control. Wind erosion, control methods, factors affecting sedimentation, sand dunes, wind breaks and mulches.
Prerequisite: General Hydrology 3716291, Introduction to Soil Science 3716205
- 3714311 Fundamental of Geographic Information Systems** 1+1Cr.
Scale and projections, GIS data types, GIS hardware demands, GIS software and capabilities, Data collection and editing, Data storage and metadata, GIS display and data sharing, GIS organizational issues. This course is designed to provide hands on experience using Idrisi 32.
- 3712450 Limnology** 2+1Cr.
Physical and chemical features of inland waters and their biological communities, zonation of lotic and lentic waters, techniques of limnological surveys. Field trips and laboratory work included.
- 3712101 Zoology** 2+1Cr.
Selected aspects of classification, phylogeny, morphology, development, physiology and ecology of animals.
Prerequisite: Biology 37100
- 3714400 Aquatic Plants** 1+1Cr.
Morphology and identification of freshwater plants in different habitats, with special emphasis to be given to the identification of local materials, effects of environmental factors on water plants, characteristics of water plants, extensive laboratory and field work included.
Prerequisite: General Botany 37110
- 3714407 Group Discussion** 1 Cr.
Current topics in fisheries and related subjects.
Prerequisite: Adviser Approval
- 3714409 Environmental Science and Agriculture** 2 Cr.
Introduction to agricultural management systems, population growth and food production, soil erosion, soil and water pollution. Effects of agricultural chemicals on natural resources.
- 3716532 Advanced Remote Sensing** 1+1Cr.
Advanced topics in remote sensing such as hyperspectral imagery (methods of analysis and interpretation), examinations of spectral libraries, mapping subpixel components with multi- and hyperspectral imagery, applications of hyperspectral imagery with the focus on rangelands and related topics, practical exercises using image processing softwares Analytical models.

UNDERGRADUATE COURSE DESCRIPTIONS for Renge and Watershed Management

- 3710141** **Geology** 2+1 Cr.
Introduction to the Earth, History of the Earth, Energy and Earth Resources, Igneous and Metamorphic Petrology, Geologic Field Methods, Stratigraphy and Sedimentology.
- 3716104** **Plant Physiology and Anatomy** 1+1Cr.
Plant cell and its structure, Photosynthesis and its products, plant respiration and assimilation, plant growth, anatomy of stem, root, leaf and flower.
- 1914103** **Calculus I** 3Cr.
Limits, sequences, and continuity, differentiation and integration. Derivations of integrals. Infinite series and convergence. The Balzano-Weierstrass Theorem and the Heine-Borel Theorem. Extensions in Euclidian n-space
- 1914104** **Calculus II** 3Cr.
Selected topics in multivariable calculus, including limits, continuity, Euler's theorem, the Jacobian, and double series; extension of single variable concepts, including uniform convergence and improper integrals
- 3716103** **Plant Morphology and Systematic** 3Cr.
Morphology of root, stem, leaf, flower and fruit, floral diagrams, principles of plant taxonomy, taxonomy of flowering plants, taxonomy of gymnosperms and angiosperms, description of major plant families with reference to main genera and species.
- 3716105** **Introduction to Natural Resources** 2Cr.
Natural resources definition and concept, characteristics of natural resources, types of natural resources, rangelands (definition, characteristics, types and importance), Iranian forest and rangeland spatial distribution, forests (definition, characteristics, types and importance), fishery and aquaculture and their importance, world main biomes, soil and water conservation, water and air pollution, national parks and wildlife and their importance.
- 3716320** **Academic English for Natural Resources** 3Cr.
Introduce the most important scientific terms of Range and Watershed management. Steps to translate and comprehensive English scientific terms.
- 3710245** **Planimetry and Surveying** 2+1Cr.
Introduces the instruments of surveying and their use in the art of determining the relative positions of points and lines on the earth's surface. Covers procedures for keeping proper field notes; causes of errors and mistakes in measurements; methods of determining accurate linear measurements; and procedures for determining distances and elevations by direct and indirect methods. Examines proper use of the transit, theodolite, compass, electronic total station, engineer's level, auto compensating level, alidade, scientific calculator, and global positioning systems.
- 3716200** **Meteorology and Climatology** 2+1Cr.
Radiation and radiation balance, air and soil temperature, air pressure, wind and general circulation, evapotranspiration, atmospheric humidity, condensation and atmospheric precipitation, climatic classifications.
Prerequisite: General Physics 2010118, Physics Lab. 2010119
- 3716205** **Introduction to soil science** 2+1Cr.
Soil texture, Soil structure, Soil genesis and classification, Soil biology, Soil fertility, soil chemistry and soil management.
- 3712200** **General Ecology** 3 Cr.
Scope of ecology. Principles and concepts pertaining to ecosystem, energy flow and transformation, biogeochemical cycles and limiting factors. Organization at the community and population levels, Biome, human and agricultural ecology.
Prerequisite: Biology 37100
- 3710246** **Probability and Statistics** 3Cr.

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Random variables and their distribution, Expectation, Special continuous model, Special discrete model, Dependence, Conditioning, Normal model

3710243 Computer acquaintance 1+1 Cr.
General information about Hardware, Operating systems and windows, Internet and Email, MS Word, MS Excel, Ms PowerPoint.

3716203 Range Management 2+1Cr.
Basic principles of range management as they apply to various regions and vegetative types, Emphasis on problems of rangeland management, Introduce the range management practices with focus on techniques appropriate for arid and semi-arid rangelands, Introduces the basics of inventory and analysis of rangeland resources. Introduce the grazing systems appropriate for different range condition. Prerequisite: General Ecology 3712200

3716208 Cartography 1+1 Cr.
Topographic map and aerial photograph, Physical characteristics of watersheds, preparation of topographical, hypsometrical, slope classification, Geographical aspects and drainage network maps, ordering network methods, planimetry and scaling maps, Image projection systems, map orientation.

3710348 Agricultural Experimental Design I 2+1.Cr.
Principles of experimental design. Actual problems from agriculture and industry. 2n and 3n factorial experiments. Blocking and confounding. Incomplete blocks. Partial repetitions. Variance and bias with different choices of experimental design. Response surface methods.

3716206 Range Plants Identification I 1+1 Cr.
Important range plants of Gramineae and Papilionaceae species families, classification and their characteristics.

3716207 Soils of Arid and Semi - Arid Regions 1+1 Cr.
Recognition and description of soils in arid and semi-arid regions; factors and processes of soil formation, salt affected soils; introduction to soil classification with emphasis on soil taxonomy.
Prerequisite:Introduction to Soil Science 3716205

3716210 Principles of Remote Sensing 2+1Cr.
Overview and history of remote sensing, the fundamentals of electromagnetic radiation, remote sensing systems: optical, thermal and active, image processing: enhancement, transformations, filtering, pre-processing, classification, applications of remote sensing in relation to soil, water, vegetation and man-made features, practical exercises using image processing software.

1610216 Strength of Materials 3Cr.
Properties of structural materials; analysis of stress and deformation in axially loaded members, circular shafts, and beams, and in statically indeterminate systems containing these components.

3716310 Range Ecology 2 Cr.
Range ecosystem components, structure and function, Limiting factors, Climatic, topographic, edaphic and biological factors influencing range plants and their distribution, primary and secondary succession.
Prerequisite:General Ecology 3712200

3716311 Range Development and Improvement 2+1Cr.
Introducing the best management and accelerated practices appropriate for arid and semi arid rangelands.
Prerequisite: Range Management 3716203

37349 Range Plants Identification II 1+1 Cr.
Important range plants of Genus of 15 families and their characteristics such as Umbelliferae, Chenopodiaceae, Cruciferae and Labiatae.
Prerequisite: Range Plants Identification I 3716206

3716201 General Hydrology 2+1Cr.
Hydrologic cycle, rainfall measurement and analysis, evapotranspiration, Infiltration, water budget, surface water and sedimentation measurements.
Prerequisite: Meteorology and Climatology 3716200, Probability and Statistics 3710246

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- 3714311 Fundamental of Geographic Information Systems** 1+1 Cr.
Scale and projections, GIS data types, GIS hardware demands, GIS software and capabilities, Data collection and editing, Data storage and metadata, GIS display and data sharing, GIS organizational issues
- 3716305 Geomorphology I** 2+1Cr.
Earth and reliefs, rock classification in geomorphology, water erosion, karstic landforms, effect of erosion on land forms, mass movements, dynamic geomorphology, stream morphology.
- 3710345 Natural Resources Economics** 2 Cr.
The natural resources economic activity as a science; value theory and its origin; capital; economic transactions agents, approaches, commodity; and the agents operations; production dependent, cost marketing; GNP; currency function and planning.
- 3716330 Water and Soil Conservation** 3 Cr.
Erosion: Worldwide and national classification, surface erosion mechanism, methods of measurement and control. Wind erosion, control methods, factors affecting sedimentation, sand dunes, wind breaks and mulches.
Prerequisite: General Hydrology 3716291, Introduction to Soil Science 3716205
- 3716336 Land Capability** 1+1 Cr.
Basic objectives, principles and assumptions, economic criteria, factors of land classifications, physical factors, technical and human factors, definition of standard land types in Iran, land units and land component, definitions of land classes, assessment of land capabilities for irrigation, dry farming, range and forestry.
- 3716333 Rangeland Ecosystem Assessment and Monitoring** 2+1Cr.
Inventory and analysis of rangeland resources, Concepts and techniques for utilization, condition, trend and suitability determination. **Prerequisite:** Range Management 3716203 and Range Ecology 3716310.
- 3716329 General Dendrology** 1+1Cr.
Definitions, Plant classification, Various examples for diagnostic principles and characters: Height, Bud, phyllotaxy, leaf, Flower, Fruit, Phenology, Bark, Form and color; plant identification key, Geography of Iran Woody Plants. Dendrology laboratory: Observing representative part of mentioned species
- 3716436 Geomorphology II** 2+1Cr.
Characteristics of arid zones, wind erosion and sand dunes, arid zones land forms, pediments and playas, analysis of aeolian sediments, dune stabilization. **Prerequisite :** Geomorphology I 3716305
- 3716322 Water Resources and problems in Iran** 2 Cr.
Water Resources, spatial and temporal distribution, related limitations, operation and distribution system in Iran. Traditional and new water management and drainage system, Consumption of salty water for irrigation . Water shortage, Water pollution, Irrigation efficiency.
- 3716432 Restoration in Arid and Semi-Arid Zones** 2Cr.
Definitions, Arid and semiarid land properties, Arid and semiarid land classification, Zonobiome III, Arid and semiarid land vegetation, Afforestation importance and History, Nursery, Seed, Afforestation practices, Preparing Afforestation Projects, Species selection, Suitable Species for arid and semiarid zones
- 3716405 Applied Hydrology** 2 Cr.
Rainfall data analysis, factors affecting runoff, rainfall- runoff relationships, methods of measurement and calculation of runoff, hydrologic data analysis, flood calculations at different return periods, maximum flood estimation methods.
Prerequisite: General Hydrology 3716201.
- 3716408 Watershed Management** 2+1Cr.
Watershed and watershed management, systemic approach in erosion control, Biological control of water erosion, erosion control strategy and planning, Channel degradation and control check dams, brushwood, loose stone, gabion and concrete check dams, stream bank erosion and control. **Prerequisite:** Soil and water Conservation 3716330, Industrial Strength of Materials 1610216
- 3716431 Cultivating and Breeding of Range Plants** 1+1Cr.

