LICENCIATURA

EM CIÊNCIAS DA NUTRIÇÃO

BACHELOR'S DEGREE IN NUTRITIONAL SCIENCES
DESCRIPTION OF CURRICULAR UNITS
ACADEMIC YEAR 2024/2025

Remark: This document should be used solely as a reference for the preparation of the Learning Agreement, and is based on the syllabus for the 2024/2025 academic year. It is subject to change. In case of discrepancies between this version and the official document, the original version written in Portuguese shall prevail.

In case of any questions, please contact the Mobility Office of NOVA Medical School: mobilidade-in@nms.unl.pt

NOVA MEDICAL SCHOOL

SUMMARY

41000 – Biologia Molecular e Celular (Molecular and Cellular Biology)

Type	Mandatory
Curricular Year	1st year
Semester	1st semester (only)
Credits	5,5 ECTS

- Molecular and cell biology in life sciences.
- Protein structure and function.
- Membrane structure, function and transport.
- Nuclear structure.
- DNA replication and repair.
- Transcription and RNA processing.
- Protein synthesis and sorting.
- Intracellular compartments and vesicular traffic.
- Degradation and recycling of biomolecules.
- Organelles.
- Cell signaling and communication.
- Cell adhesion and extracellular matrix.
- Cell cycle.
- Cell movement, senescence and apoptosis.
- Embryogenesis and development.
- Tissue morphogenesis.

41001 – Nutrição e Metabolismo I (Nutrition and Metabolism I)

Type	Mandatory
Curricular Year	1st year
Semester	1st semester (only)
Credits	5 ECTS

Module 1:
- Complexity of the food matrix.
- Structure and biological role of macronutrients.
- Fluid and electrolyte balance.
- General notions of enzymatic activity.

Module 2:
- Metabolic relevance of gastrointestinal motility.
- GI secretions.
- Regulations of motility and secretion at the level of the gut.
- Digestion and assimilation of nutrients.
- Microbiota.

Module 3:
- Glucose metabolism.
- Glucose metabolism regulation: insulin and glucagon relevance.

41002 – Sociologia e História da Alimentação (Sociology and History of Food)

Type	Mandatory
Curricular Year	1st year
Semester	1st semester (only)
Credits	3 ECTS
This course is organised into two modules covering the history and sociology of food. The 1st module, Food History, discusses food as medicine, food culture in the Mediterranean context, the ancestral ways of preserving food products, the assimilation of new products in the Iberian and Mediterranean spaces, food and conviviality, the models of sociability at the table and the influence of cookbooks on food practices. In the 2nd module, Sociology of Food, the social construction of health and illness related with food, the changes in conceptions of diet and health and the role of food in the construction of identities are discussed. Also discussed is the food modernity and the transformations in the act of eating, food from a systemic perspective, and the economic, social, ethical and environmental aspects that are associated with the production, transformation, distribution, consumption and discarding of food.	

41003 – Produção Primária de Alimentos (Primary Production of Food)

Type	Mandatory
Curricular Year	1st year
Semester	1st semester (only)
Credits	5,5 ECTS

Plant production:

- Farming systems (objectives, principles, regulations, certification).
- Traditional agriculture and industrial agriculture.
- Sustainable agricultural systems (integrated production, organic production, precision agriculture) and other systems (biodynamic farming, permaculture).
- Case studies (objectives, marketing, regulation, control strategies of pests and diseases).
- Introduction to horticulture: concepts, importance of the sector, trends, challenges.
- Installation of crops: crop selection and mode of production, selection and characterization of the installation site, site preparation, culture installation.
- Protected crops: typologies, environmental conditioning in greenhouses: objectives and importance, available tools.

Animal production:

- Characterization of primary production in Portugal.
- The animal production as primary unit.
- Productive planning.
- Importance of animal feed control in food safety.

41004 – Química dos Alimentos (Food Chemistry)

Type	Mandatory
Curricular Year	1st year
Semester	1st semester (only)
Credits	5,5 ECTS

Theoretical:

- Chemical functions; isomers; chemical reactions and kinetics.
- Carbohydrates: structure and function; reactions with monosaccharides.
- Proteins: aa constitution and structure; reactions during food processing.
- Lipids: characterization, chemical properties and reactions.
- Water.
- Antioxidants and prooxidants.
- Vitamins.
- Natural and artificial pigments.
- Additives and chemical contaminants.

Practical:

- Distinction of biologic compounds based on its functional groups.
- Characterization of carbohydrates; iodine coloration, reducing power. Starch hydrolysis.
- Carbohydrate analysis in breakfast cereals.
- Lipid solubility. Emulsion stabilization. Unsaturated fatty acids and hydroperoxidone identification.
- Identification of amino acids and proteins. Protein precipitation.
- Quantification of soluble proteins from milk.
- Determination of ascorbic acid in juices.
- Quantification of total phenols from olive oil.

41005 – Alimentação Humana (Human Nutrition)

Type	Mandatory
Curricular Year	1st year
Semester	1st semester (only)
Credits	5,5 ECTS

- Global perspective on food intake.
- Main determinants of food choices.
- Food recommendations: food groups and food guides.
- Portuguese food composition table.
- Nutritional characteristics of foods and beverages.
- Food recommendations in special physiological situations, namely pregnant and lactating, children and the elderly.
- Chronobiology applied to food.
- Mediterranean diet and cardiovascular disease prevention.
- Vegetarian diet across the lifecycle.
- Diet and cancer.

41006 – Nutrição e Metabolismo II (Nutrition and Metabolism II)

Type	Mandatory
Curricular Year	1st year
Semester	2nd semester (only)
Credits	5 ECTS

Module 1:
- Protein metabolism.
- Inborn erros of aminoacid metabolism.
- Purine and pyrimidine bases.
- Heme group.
- Lipid metabolism.
- Cholesterol and bile acids; diet, cholesterol and hypertension.
- The macronutrients and cell signaling molecules.
- Metabolism integration.

Module 2:
- Vitamins.
- Oligoelements.
- Micronutrients and metabolic disorders.

Module 3:
- Nutrients and intrauterine ontogenesis (epigenetic regulation of gene expression).
- Chronobiology, metabolism and nutrition.
- Metabolism in physical activity.
- Microbiota.
- Non-communicable chronic diseases.

41007 – Bioestatística (Biostatistics)

Type	Mandatory
Curricular Year	1st year
Semester	2nd semester (only)
Credits	3 ECTS

- Summarizing data.
- Presenting data.
- Correlation coefficients (Pearson, Spearman, and Kendall). Normal, Student's t, Chi-Squared, and Snedecor's F distributions.
- Sampling methods.
- Questionnaires.
- Statistical inference: estimation and hypotheses tests: basic concepts, one-sample tests, two independent samples tests (z test, t test, and Mann-Whitney test), paired samples tests (paired t-test, Wilcoxon, and Sign test), more than two independent samples tests (ANOVA I and Kruskal-Wallis) and more than two related samples test (Friedman).
- Analysis of cross-tabulations (Chi-squared test for association and Fisher's exact test) and McNemar's test for matched samples.
- Interpreting results obtained by linear, logistic and Cox regression models.
- SPSS functionalities that will enable students to analyze the data with the statistical methodologies previously taught.

41008 – Morfologia I (Morphology I)

Type	Mandatory
Curricular Year	1st year
Semester	2nd semester (only)
Credits	5 ECTS

General Anatomy.

Topographical Anatomy and Development of the Limbs:

- Osteology and arthology of the upper limb.
- Muscles of the upper limb.
- Vascular and lymphatic drainage of the upper limb.
- Pelvis.
- Osteology and arthology of the lower limb.
- Muscles of the lower limb.
- Vascular and lymphatic drainage of the lower limb.
- Development of the limbs.

Topographical Anatomy and Development of the Thorax:

- Osteology and arthrology of the thorax.
- Muscles of the thorax.
- Ventilation mechanics.
- Vascular and lymphatic drainage of the thorax.
- Anatomy and Histology of the Histology of the Respiratory System.
- Development of the Respiratory System.
- Anatomy and Histology of the Hematopoietic and Lymphatic System.

Topographical Anatomy and Development of the Abdomen:

- Muscles of the abdominal wall.
- Vascular and lymphatic drainage of the abdomen.
- Anatomy and Histology of the Endocrine System.
- Development of Endocrine System.
- Anatomy and Histology of the Digestive System.
- Anti-reflux mechanisms.
- Development of Digestive System.
- Peritoneum.

41009 – Genética (Genetics)

Type	Mandatory
Curricular Year	1st year
Semester	2nd semester (only)
Credits	3 ECTS

Structure and Function of genes and Organization of the Human Genome:

- Genome Organization. Chromatin structure. Karyotype.
- Regulation of gene expression. Epigenetics.
- Transposable elements and repetitive sequences.

Genes and Disease:

- Transmission patterns of autosomal recessive, dominant and X -related situations. Clinical presentation and mechanisms. Modifying factors of expression:
  Metabolic conditions.
  Rasopathies and trinucleotide repeated diseases.
  Cancer genetics.
  Organ diseases.
- Mutations and pre-mutations. Trinucleotide expansion diseases.
- Multifactorial inheritance. Interaction of genes and with environmental factors and role in pathology.

Chromosomes and Chromosomal Pathology:

- Mechanisms of chromosomal alterations.
- Numerical and structural chromosomal abnormalities, and mosaics. From cytogenetics to the clinical presentation.

Population Genetics:

Gene frequencies. Allelic frequencies and genetic drift. Effect of inbreeding and neo-mutations in frequency. Evolutionary principles to understand human biology and pathology.

41010 – Nutrição Humana (Human Nutrition)

Type	Mandatory
Curricular Year	1st year
Semester	2nd semester (only)
Credits	6 ECTS

- General concepts. Functions of macro and micronutrients.
- Requirements and recommendations.
- Energy and nutrients.
- Energy.
- Carbohydrates.
- Protein.
- Fats.
- Minerals.
- Vitamins.
- Water and alcohol.
- Recommended intakes of nutrients for pregnant women, breastfeeding, teenagers, the elderly, athletes. Practical considerations inherent to the recommended intakes.

41011 – Comunicação em Saúde (Health Communication)

Type	Mandatory
Curricular Year	1st year
Semester	2nd semester (only)
Credits	5 ECTS

- Anthropology and history of communication.
- Science communication.
- User-centered communication/active listening.
- Crisis communication.
- Health literacy.
- Political communication.
- Strategic marketing/health communication campaigns.
- Press relations/strategic communication.
- Social media and new communication formats.
- Traditional media: challenges and opportunities.

41012 – Imunologia (Immunology)

Type	Mandatory
Curricular Year	2nd year
Semester	1st semester (only)
Credits	4 ECTS

- SI: constitution and operation.
- Innate and adaptive immune response.
- Complement system.
- Complement and disease.
- Maturation of T and B cells.
- Antibodies and antigens.
- MHC and mechanisms of antigen presentation.
- Immune response mediated by T and B cells.
- Immune tolerance and regulation mechanisms.
- Hypersensitivity reactions.
- Primary immunodeficiencies.
- Allergy and hypersensitivity.
- Autoimmunity.
- Food allergy.
- Immunity and nutrition.
- Immunopathology diabetes.
- Nutrition and immunity.
- Allergy and cross reactivity: clinical cases.
- Allergy and food intolerance.
- Immunosuppression in exercise.
- Immune response evaluation in clinical practice: clinical and laboratory integration.

41013 – Epidemiologia Nutricional (Nutritional Epidemiology)

Type	Mandatory
Curricular Year	2nd year
Semester	1st semester (only)
Credits	4 ECTS

Theoretical:

- Nutritional Epidemiology (NE) and clinical epidemiology.
- Dependent variables and independent variables.
- Outcome measures and measures of association.
- Tests and statistical models.
- Confounders, bias, modifier effect, interaction, collinearity.
- Design, implementation and conduct of research studies.
- Observational studies.
- Intervention studies.
- Instruments and scales.
- Measurement of food intake.
- Biological markers for assessing the nutritional intake and nutritional status.
- Sample size and power of the study.
- Ethics in human research.

Lab session:

- Evaluation and discussion of scientific articles.
- How to make a presentation.
- Scientific projects evaluation and design.
- Seminars on nutrition and clinical epidemiology applied to some specific diseases and conditions.

41014 – Fisiologia (Physiology)

Type	Mandatory
Curricular Year	2nd year
Semester	1st semester (only)
Credits	9 ECTS

- Introduction to Physiology: from cells to systems.
- Biophysics of excitability.
- Synaptic transmission.
- Autonomic nervous system.
- The sensorial system.
- Mechanisms underlying muscle contraction.
- Functional aspects of the cardiovascular system.
- Regulatory aspects in the cardiovascular system.
- Physical aspects underlying the exchange of gases in the lung.
- Mechanical determinants of ventilation.
- Mechanisms underlying respiratory regulation.
- Renal function.
- Digestive physiology: Neurogastroenterology and motility of the digestive tract; digestive secretions (saliva, gastric, biliary, pancreatic and intestinal); intestinal absorption; regulation of the activity of the digestive tract.
- Hormones and mechanisms underlying the function of the reproductive organs.
- Exercise physiology.

41015 – Morfologia II (Morphology II)

Type	Mandatory
Curricular Year	2nd year
Semester	1st semester (only)
Credits	5 ECTS

Integumentary System.

Musculoskeletal Anatomy:
- Osteology and arthrology of the head.
- Muscles of the head and neck.
- Vascular and lymphatic drainage of the head and neck.
- Osteology and arthrology of the spine.
- Muscles of the back.

Morphology and Development of the Nervous System:
- Development of the nervous system.
- Histology of the nervous system.
- Encephalon.
- Cranial nerves.
- Spinal cord.
- Spinal nerves.
- Arterial and venous drainage of the central nervous system.
- Sensory organs.
- Autonomic nervous system.

Topographic Anatomy and Development of the Pelvic Cavity:
- Pelvis.
- Muscles of the gluteal region.
- Anatomy and histology of the urinary system.
- Development of the urinary system.
- Anatomy and histology of the male reproductive system.
- Anatomy and histology of the female reproductive system.
- Development of the reproductive system.
- Perineum.
- Vascular and lymphatic drainage of the pelvic cavity.

41016 – Microbiologia Básica (General Microbiology)

Type	Mandatory
Curricular Year	2nd year
Semester	1st semester (only)
Credits	4 ECTS

- Main characteristics of the different groups of microorganisms (bacteria, viruses, fungi and parasites).
- Pathogenicity mechanisms. Vaccination and passive immunization.
- Description of the main pathogenic and commensal bacteria for humans.
- Description of the main pathogenic viruses for humans.
- Description of the major pathogens and commensal fungi to humans.
- Description of the major pathogenic parasites to humans.
- Diagnostic microbiology: methods used for microbial identification (microscopy, cultures, biochemical methods, antigen detection, molecular biology, proteomic analysis). Typing methods in Microbiology.

41017 – Tecnologia Alimentar e Novos Produtos (Food Technology and Product Development)

Type	Mandatory
Curricular Year	2nd year
Semester	1st semester (only)
Credits	4 ECTS

- Introduction to food technology.
- Unit operations in food processing: raw material preparation; extraction and separation of food components; size reduction; mixing, forming and coating.
- Unit operations in food preservation: chemical and microbiological methods; control of water, structure and atmosphere; application and removal of heat and energy.
- Introduction to the fermentation process: general concepts and principles, microorganisms used, process steps and application in the food industry.
- Technologies used in collective catering.
- Technologies and materials used in the packaging, transport, processing and preservation of food products.
- Bioactive ingredients used in the development of functional foods.
- Development of new products and improvement of traditional products.
- Effect of processing methods on sensory and nutritional properties of foods.
- New technologies for food processing.

41018 – Biopatologia (Biopathology)

Type	Mandatory
Curricular Year	2nd year
Semester	2nd semester (only)
Credits	5 ECTS

Pre-requisites: human anatomy, histology and embryology, physiology, and genetics.

<u>The general themes</u>:

- Introduction to biopathology.
- Reversible and irreversible cell injury and disease causes.
- Cell death (types) and forms of cellular adaptation and aging.
- Inflammation, types and disorders of inflammation and immunity groups.
- Vascular changes.
- Neoplasms.
- Genetic factors and disease.
- Environmental and nutritional factors and disease in different organs and systems.

41019 – Fisiopatologia (Physiopathology)

Type	Mandatory
Curricular Year	2nd year
Semester	2nd semester (only)
Credits	5 ECTS

- Problem-Based Learning and teaching of Pathophysiology.
- Pathophysiology of digestive motility disorders.
- Pathophysiology of malabsorption syndrome.
- Gastro-esophageal reflux disease (GERS).
- Pathophysiology of hepatic and pancreatic disorders.
- Pathophysiology of overweight and obesity.
- Functional evaluation of the digestive and of nutrition disorders.
- Chronic respiratory diseases and nutritional status.
- Mechanisms of food allergy and food intolerance.
- Pathophysiology of anemic syndrome (acute/chronic).
- Pathophysiology of acute coronary syndrome and of heart failure.
- Pathophysiology of electrolyte and acid-base balance disorders.
- Pathophysiology of chronic renal failure.
- Pathophysiology of acute and chronic renal failure.
- Pathophysiology of diabetes and of metabolic syndrome.

41020 – Microbiologia Alimentar (Food Microbiology)

Type	Mandatory
Curricular Year	2nd year
Semester	2nd semester (only)
Credits	4 ECTS

- Microorganisms in food: deterioration vs. food production.
- Concept of intestinal microbiota and its contribution to physiological balance. Main genera and species constituting the intestinal microbiota. Brief notion of dysbiosis and risk of disease.
- Main microorganisms (bacteria, viruses, parasites and fungi) pathogenic to humans transmitted through food (distinguish between microorganisms that cause gastrointestinal pathology and microorganisms that have a gastrointestinal entry point but affect other organs or systems).
- Main sources of food microbial contamination and factors that favor microbial growth in food.
- The laboratory diagnosis of gastrointestinal infections.
- Microbiological analysis used in food, water for human consumption, surfaces and food handlers.
- The principles of prevention of foodborne infections.

41021 – Bromatologia (Bromatology)

Type	Mandatory
Curricular Year	2nd year
Semester	2nd semester (only)
Credits	4 ECTS

- Food product analysis – general concepts.
- Sampling techniques and sample preparation.
- Analytical techniques in food products analysis – volumetry, spectrophotometrics and chromatography.
- Extraction and purification analysis.
- Analysis methodologies: humidity, ash, total protein and fat, total sugars and fiber. Methods for vitamins and minerals determination.
- Lipid, protein and carbohydrate characterization.
- Calculus and discussion of theoretical and chemical composition.
- Analytical strategy for the quantitative determination of additives and contaminants (residues, pesticides, growth promoters and food contact materials) in food and other minority components.

41022 – Saúde Pública (Public Health)

Type	Mandatory
Curricular Year	2nd year
Semester	2nd semester (only)
Credits	4 ECTS

- Public Health (PH) – overview and general principles; health, development and determinants: social, environmental, economic and cultural.
- PH ethics.
- Multidisciplinary, cross-cutting and research; human rights, individual responsibility, citizenship, law and social justice.
- Population and health: dynamic population – ageing.
- Indicators of health and introduction to PH research.
- Review of descriptive epidemiology, ecological studies, health systems.
- Health promotion – changing behaviors.
- Health communication.
- Epidemics; communicable diseases and non-communicable diseases.
- Disasters and PH.
- Genetic/diabetes/obesity – the PH approaches.
- Health and environment – climate change and populations.
- Quality of health services.
- Big issues of nutrition and contemporary PH.
- Screening, screening tests and diagnostics.
- Epidemiological surveillance of waterborne and foodborne diseases.
- The concept of “One Health”.

41023 – Gastrotecnia (Science of Food Processing)

Type	Mandatory
Curricular Year	2nd year
Semester	2nd semester (only)
Credits	5 ECTS

- Study of chemical transformations of nutrients in culinary processes applied to food.
- Cooking methods.
- Notions of organoleptic assessment of food.
- Experimental study and healthy cooking methods applied to various foods.
- Food processing science applied:
  Modified-texture diets.
  Infant feeding.
  Vegetarian diet.
  Molecular gastronomy.

41024 – Marketing Alimentar e Nutricional (Marketing on Food and Nutrition)

Type	Mandatory
Curricular Year	2nd year
Semester	2nd semester (only)
Credits	3 ECTS

- Marketing and advertising: concepts and models.
- Strategic marketing planning: marketing strategies and integrated marketing communication tools.
- Trends in food consumption and consumer behavior.
- Marketing of food and its influence on the choices/eating behaviors.
- Nutritional and health claims in the context of food marketing and nutrition.
- Regulation of food and nutrition marketing: European context and in Portugal.
- Social marketing to promote healthy eating habits.
- Marketing of health services: branding and management of a health brand.
- Ethics in food marketing and nutrition.

41025 – Metodologias de Investigação (Research Methods)

Type	Mandatory
Curricular Year	3rd year
Semester	1st semester (only)
Credits	5 ECTS

Module 1:

- The scientific method in Nutritional Sciences.
- Animal models applied to research in nutrition (eat, mouse, or other) – requirements, advantages and disadvantages of these models. Animal models commonly used for various metabolic diseases: knockout animals, transgenic, obesity-diet induced/diabetes-diet induces, among others.
- Cellular models in nutritional research.
- Translation of nutritional research.

Module 2:

- Presentation and discussion of LIC (Clinical Research Law): clinical studies of nutrition.
- European regulations for nutritional and health claims.
- Clinical studies in nutrition: leges artis. Special features of experimental design (intervention studies and observational studies).

Module 3:

- Ethical and deontological problems in these studies.
- Trial registration. Documents required for the approval by the Ethics Committee.
- Clinical studies and National Data Protection Commission.

Module 4:

- Scientific writing.
- The dissemination of science.

41026 – Farmacologia (Pharmacology)

Type	Mandatory
Curricular Year	3rd year
Semester	1st semester (only)
Credits	4 ECTS

- Introduction to Pharmacology.
  Drug, toxic and nutrient concepts.
  Pharmacodynamics – molecular mechanisms of drug action.
  Pharmaceutical forms.
  Pharmacokinetics.
- Pharmacology of the Central Nervous System.
- Pharmacology of the Autonomic Nervous System: adrenergic and cholinergic transmission.
- Pharmacology of the digestive system.
- Endocrine Pharmacology.
- Pharmacology of corticosteroids and anabolic steroids.
- Pharmacology of the cardiovascular system.
- Pharmacology of the respiratory system.
- Antibacterials, antivirals and antifungals.
- Antineoplastics.
- Drugs of abuse.
- Drug-nutrient interaction.

41027 – Toxicologia Alimentar (Food Toxicology)

Type	Mandatory
Curricular Year	3rd year
Semester	1st semester (only)
Credits	5 ECTS

Theoretical:

- Toxicokinetics – xenobiotic absorption.
- Transmembrane transport mechanisms.
- Xenobiotics distribution.
- Excretion and reabsorption of xenobiotics.
- Transmembrane transport of endo- and xenobiotics.
- Biotransformation of xenobiotics: Phase I, II, and III.
- Mechanisms of toxicity.
- Genomics and non-genomics carcinogenesis.
- Food mutagens and carcinogens.
- Impact of non-nutrients on health: endocrine disruptors.
- Phytochemicals (genomic and epigenomics effects).
- Xenobiotics in food (food matrix, whose synthesis is exogenous to the food itself, resulting from environmental contamination; formed during food processing).

Lab program:

- Toxicological methods.
- Basic concepts in laboratory methodologies and laboratory security.
- Principles of animal testing in research.
- Toxicity evaluation assays.
- Writing a case study report.

41028 – Segurança Alimentar (Food Safety)

Type	Mandatory
Curricular Year	3rd year
Semester	1st semester (only)
Credits	4 ECTS

Principles and concepts of food safety.

European Union food legislation:
- European Union legislation on food hygiene.
- Implementation of European legislation at national level.
- European and national competent authorities.

Good hygiene practice and prerequisite programs:
- Good hygiene practices and the prerequisite programs applicable throughout the food chain.
- Traceability, notification and product recall.

The HACCP system:
- HACCP system overview.
- Principles of HACCP.
- Implementation and maintenance of a HACCP system.
- Case studies.

Food chain safety:
- Globalization of the food supply with food safety implications (rapid dissemination of foodborne diseases).
- Biotracing of biological contaminants.
- Prevention and mitigation of bioterrorism.
- Continuous temperature monitoring along the food supply chain.
- Trust and interdependence in food supply chain.

41029 – Ferramentas de Gestão em Alimentação (Management Tools in Food Sciences)

Type	Mandatory
Curricular Year	3rd year
Semester	1st semester (only)
Credits	3 ECTS

Organization:

- Concepts and objectives of an organization.
- The life cycle of an organization.

The Management of Organizations:

- Concept of management and evolution of management thinking.
- Functions of management and the manager.
- Definition of service and leadership concepts.
- Importance of leaders and their role.
- Main theories about leadership.
- Leadership styles.
- Leadership vs. management.
- Leadership and team development.
- Motivation vs. satisfaction.
- Motivational theories.
- Effectiveness and efficiency.
- Change management.

Organization and Business Strategy:

- Definition of the concept of strategy.
- Strategical management. Phases to develop a Strategic Plan.
- Competitive advantage.

Decision-making support tools:

- Management cycle.
- Definition of objectives.
- SMART methodology.
- Main management tools.
- Performance indicators and their application.

Entrepreneurship, Business Plan:

- Business Plan objectives.
- Types of Business Plans.
- Structure, dimension and topics to be addressed.

41030 – Nutrição Materna e Pediátrica (Maternal and Pediatric Nutrition)

Type	Mandatory
Curricular Year	3rd year
Semester	1st semester (only)
Credits	5 ECTS

Theoretical:

- Nutrition in pregnant women with comorbidities.
- Programming of metabolic disease due to overnutrition and fetal undernutrition.
- Breastfeeding.
- Gut microbiota in pregnant women and newborns.
- Dietary and nutritional recommendations in pediatrics.
- Infant formulas.
- Vitamins and supplements in the first year of life.
- Dietary diversification.
- Food and nutrition in preschool and school-age children.
- Assessment of nutritional status in newborns.
- Obesity in children and adolescents.
- Nutrition for children with allergies.
- Special diets.
- Nutrition and chronic diseases and hereditary metabolic disorders.

Theoretical-Practical:

- Protein theory.
- Analysis of Portuguese literature on pediatric obesity.
- Dietary planning for infants, adolescents, and vegetarian children.
- Intervention in constipation, diabetes mellitus, and phenylketonuria.

Practical:

- Neonatal nutritional intervention in special care.
- Nutritional intervention in children with metabolic disorders.

41031 – Avaliação Nutricional (Nutritional Assessment)

Type	Mandatory
Curricular Year	3rd year
Semester	1st semester (only)
Credits	4 ECTS

- Basic concepts in nutritional assessment.
- Diagnosis of malnutrition – screening and nutritional assessment.
- Epidemiology of malnutrition.
- Physical exam: nutritional semiology.
- Subjective global assessment.
- Biochemistry evaluation.
- Assessment of food intake – National level, family level, individual level.
- Assessment of body composition.
- Anthropometry.
- Evaluation and estimation: weight, height, circumferences, skin folds.
- Growth charts and cutoff points.
- Theory and methods of body composition.

41032 – Nutrição no Desporto (Nutrition in Sport)

Type	Mandatory
Curricular Year	3rd year
Semester	2nd semester (only)
Credits	4 ECTS

- Exercise physiology.
  General concepts of physiology.
  Physiological assessment of physical capacities.
- Energy metabolism.
- Nutritional requirements in physical exercise. Particular needs and recommendations.
  Proteins.
  Carbohydrates.
  Lipids.
  Micronutrients and phytochemicals.
  Hydration.
- Body composition in sport and nutrition.
  Fat mass management.
  Muscular hypertrophy.
- Dietary supplements in sport.
- Discussion of current issues in nutrition and sport.
- Case studies.

41033 – Nutrição em Geriatria (Geriatric Nutrition)

Type	Mandatory
Curricular Year	3rd year
Semester	2nd semester (only)
Credits	4 ECTS

Theoretical:

- Biology of aging.
- Clinical assessment of the elderly: global assessment and nutritional screening/assessment.
- Malnutrition in the geriatric population.
- Nutritional needs of the elderly.
- Aging of organ systems: Musculoskeletal, Endocrine, Gastrointestinal, Nervous, Cardiovascular, Respiratory, Urinary, Immunological, Homeostatic (hydro-electrolytic).
- Modification of the nutritional status of the elderly: adapted basic food and oral nutritional supplements.
- Dysphagia.
- Polypharmacy and drug-nutrient interaction.
- Aging and oncology.
- Nutritional intervention in the elderly in palliative care.
- Diet and healthspan: effects of caloric restriction and intermittent fasting.

Practical:

- Study and discussion of clinical cases.
- Presentation and discussion of scientific articles (“Journal club”).

41034 – Qualidade Alimentar e Sistemas de Gestão (Food Quality and Management Systems)

Type	Mandatory
Curricular Year	3rd year
Semester	2nd semester (only)
Credits	4 ECTS

- Fundamentals of the Quality Management in Nutrition.
- The Portuguese system for quality.
- Management systems:
  Quality management systems: fundamentals and vocabulary (ISO 9000:2015), requirements (ISO 9001:2015) and guidance to achieve success (ISO 9004:2018).
  Food safety management systems (ISO 22000:2018, FSSC 22000, BRCGS and IFS).
  Integrated management systems (e.g. ISO 22000, ISO 9001, ISO 140001 and ISO 45001).
- Production and food production certification:
  Certification of integrated and organic production.
  GLOBAL G.A.P. certification.
  Products with protected designation of origin (DOP), protected geographical indication (IGP) and guaranteed traditional specialty (ETG).
  Product certification according to ISO/IEC 17067.
- Audits and quality control in foods:
  Audits on FSQMS according to ISO 19011:2018.
  Characteristics of food quality.
  Sensory analysis to assess food quality.
  Tools for quality control and improvement.

41035 – Psicologia e Nutrição (Psychology and Nutrition)

Type	Mandatory
Curricular Year	3rd year
Semester	2nd semester (only)
Credits	5 ECTS

- Contributions of Psychology for clinical nutrition and community nutrition/public health.
- Introduction to mental functioning (models), cognitive functions, personality.
- Human development/life cycle.
- Family, occupational and sociocultural factors in human behavior.
- Stress and coping in health/disease.
- Psychosocial and cultural determinants of eating behavior. Eating styles. Acquisition of eating habits throughout the life cycle. Learning, cognition and emotions in eating behavior. Psychological factors in obesity.
- Psychological adaptation to disease, e.g. metabolic problems. Reactions to hospitalization and terminal illness.
- Changing eating behaviors: stages and strategies.
- Basic techniques of communication and counselling in clinical nutrition. Motivational interviewing and treatment adherence. Common factors in therapeutic relationships. Difficult situations.
- Mental disorders as related to altered eating behavior.

41036 – Dietoterapia I (Diet Therapy I)

Type	Mandatory
Curricular Year	3rd year
Semester	2nd semester (only)
Credits	6 ECTS

- Eating disorders.
- Obesity.
- Diabetes mellitus.
- Heart disease.
- Lipid disorders.
- High blood pressure.
- Hyperuricemia and gout.
- Gastrointestinal disease (esophagus; stomach; bowel and colon; liver; gallbladder; exocrine pancreas).

41037 – Nutrição Comunitária (Community Nutrition)

Type	Mandatory
Curricular Year	3rd year
Semester	2nd semester (only)
Credits	4 ECTS

- Community Nutrition and Public Health.
- Principles of nutritional epidemiology.
- Determinants of dietary intake and of nutritional status.
- Ethical considerations in community nutrition.
- Planning and evaluation of community nutrition programs.
- Nutrition education: the school context example.
- Nutritional intervention in distinct communities.
- Development of food-based dietary guidelines.
- Example of community nutrition program.

41038 – Ética e Deontologia Profissional (Professional Ethics and Deontology)

Type	Mandatory
Curricular Year	3rd year
Semester	2nd semester (only)
Credits	3 ECTS

- Fundamental concepts dealing with human action: ethics, moral, law, professional ethics (codes of professional ethics) and applied ethics (from the professional to the patient).
- Elements constituting moral life: principles, norms, virtues, rights and duties.
- Introduction to the concept of narrative ethics.
- Main contemporary ethics theories: principlism, utilitarianism, and consequentialism, communitarianism and contract contractualism, discussion.
- The institutionalization of bioethics: national and international contexts.
- Deontological fundamentals of the nutritionist profession.
- Ethics in research and scientific integrity.
- The ethics of nutritional intervention in Public Health: precautionary principle.
- The ethical dimension in the formation and performance of a Nutritionist. Technical responsibility of a Nutritionist in different scenarios of professional practice.
- Main ethical issues in food and nutritional sciences.
- Privacy and confidentiality: RGPD.

41039 – Projeto de Investigação (Research Project)

Type	Mandatory
Curricular Year	4th year
Semester	1st semester (only)
Credits	5 ECTS

- Introduction to nutrition research project.
- Formulation of the research question and aims: a systematized approach.
- Selecting appropriate study designs.
- Selection of methods and instruments for data collection, management and analysis. Selection of participants and recruitment: specification, sampling and methods. Addressing ethical and legal issues.
- Research project planning: tasks; roles and responsibilities; timeline and milestones; costs; monitoring and contingency plan.
- Writing a research proposal.

41040 – Bioestatística II (Biostatistics II)

Type	Mandatory
Curricular Year	4th year
Semester	1st semester (only)
Credits	4 ECTS

- Hypothesis tests revision: tests for two independent samples, tests for paired samples, Chi-squared test, Fisher's exact test and McNemar's test, non-parametric tests for more than two independent (Kruskal-Wallis) and related samples (Friedman's test).
- Logistic regression model: model fitting, logit linearity assumption and interpretation of results.
- Guidelines for the design, conduct and reporting of human intervention studies to evaluate the health benefits of foods.

41041 – Alimentação Coletiva e Gestão (Food Quality and Management Systems)

Type	Mandatory
Curricular Year	4th year
Semester	1st semester (only)
Credits	6 ECTS

- Food service: historical aspects.
- The food supply chain.
- The food sector: characterization, typology.
- Introduction to the management of Collective Food Units (UAC).
- From nutritional recommendations to meal service – menus.
- From nutritional recommendations to meal service – per capital portion sizes.
- From nutritional recommendations to meal service – technical recipes.
- Planning of the meal service: facilities, equipment and utensils; people management; products and raw materials.
- Production of the meal service: storage; meal production; provision of the meal service; models of production and distribution of meals.
- Transversal processes of the activity: notion and market vision; service processes; operation support processes; standards/certifications in food service; monitoring, analysis and evaluation for improvement.
- Importance and preparation of economic study, budget and income statement.

41042 – Dietoterapia II (Diet Therapy II)

Type	Mandatory
Curricular Year	4th year
Semester	1st semester (only)
Credits	4 ECTS

- Intestinal bowel diseases (Chron's disease, Ulcerosis colitis).
- Renal diseases (Nephritic syndrome, nephrotic syndrome, acute and chronic renal failure).
- Pulmonary diseases.
- Neurologic diseases (cerebrovascular accident; degenerative neurologic diseases, spinal lesions, dysphagia, epilepsy).
- Cancer disease.
- AIDS and HIV.
- Metabolic stress (surgery, burns).
- Wound healing.
- Allergies and food intolerances (milk protein, lactose intolerance, celiac disease).
- Endometriosis.
- Vitamin and mineral deficiencies (anaemia and osteoporosis).
- Hereditary metabolic diseases (cystic fibrosis,

41043 – Nutrição Artificial (Artificial Nutrition)

Type	Mandatory
Curricular Year	4th year
Semester	1st semester (only)
Credits	5 ECTS

- Importance of nutritional support.
- Nutritional assessment; estimations of energy, protein and fluid requirements.
- Oral nutrition (oral nutrition supplements, including products for dysphagia) and enteral nutrition (indications and counter-indications; complications; routes and methods to administer enteral nutrition; commercial enteral nutrition formulas; analysis and discussions of guidelines and case studies).
- Parenteral nutrition (indications and counter-indications; complications; peripheral and central access; commercial formulas; analysis and discussion of guidelines and case studies).
- Monitoring of nutritional support.
- International guidelines for nutritional support in different clinical situations.
- Drug and nutrient interactions in artificial nutrition.
- Home nutritional support.
- Ethics and legal aspects of nutritional support.

41044 – Política Nutricional (Nutritional Policy)

Type	Mandatory
Curricular Year	4th year
Semester	1st semester (only)
Credits	4 ECTS

- Past, present and future challenges of health systems.
- The Portuguese Health System: organizational chart and challenges.
- Central structures of the Portuguese Health System: dynamics and challenges.
- Regional structures of the Portuguese Health System: dynamics and challenges.
- Local structures of the Portuguese Health System: dynamics and challenges.
- Legislative process in health: dynamics and challenges.
- Basic concepts in nutritional policy. Analysis of national and international nutritional policies.

41045 – Estágio (Traineeship)

Type	Mandatory
Curricular Year	4th year
Semester	2nd semester (only)
Credits	30 ECTS

The Curricular Unit internship is essentially practical, focusing on disease prevention, treatment and promotion across the different scopes within the nutritional practice, namely:

- Clinical nutrition – nutritional diagnosis; personalized/individual nutritional care; nutritional education and nutrition and health communication.
- Sports nutrition – nutritional diagnosis; personalized/individual nutritional care focusing on performance and injury prevention; nutritional education; nutrition and health communication.
- Public Health nutrition – collective nutritional care; education and communication in nutrition and health.
- Community nutrition – nutritional care within specific communities with specific nutritional needs; and nutrition and health communication.
- Research – which may involve one or more of the 4 areas above mentioned.