University of Ferrara
Department of Chemical, Pharmaceutical and Agricultural Sciences

MSc Food Safety and Food Risk Management

Food Safety and Product Design

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Biosketch -
PhD in Chemistry @ UNIFE, major topic: analytical chemistry (proteomics), 2005
Postdoc fellow @ The University of Tennessee, Knoxville (TN, USA), 2006-2008
ERASMUS+ teaching @ University of Valencia & CIAL-CSIC Madrid (Spain) - 2018
Associate Professor in Food Chemistry - 2019

Food Chemistry @ BSc in Chemistry
Fundamentals of Food Chemistry @ BSc in Biotechnology
Quality of Agrifood Products @ MSc Agricultural Biotech. for the agrifood supply ch.
Chemistry and Biotechnology of food and cosmetics @ MSc Industrial Biotech

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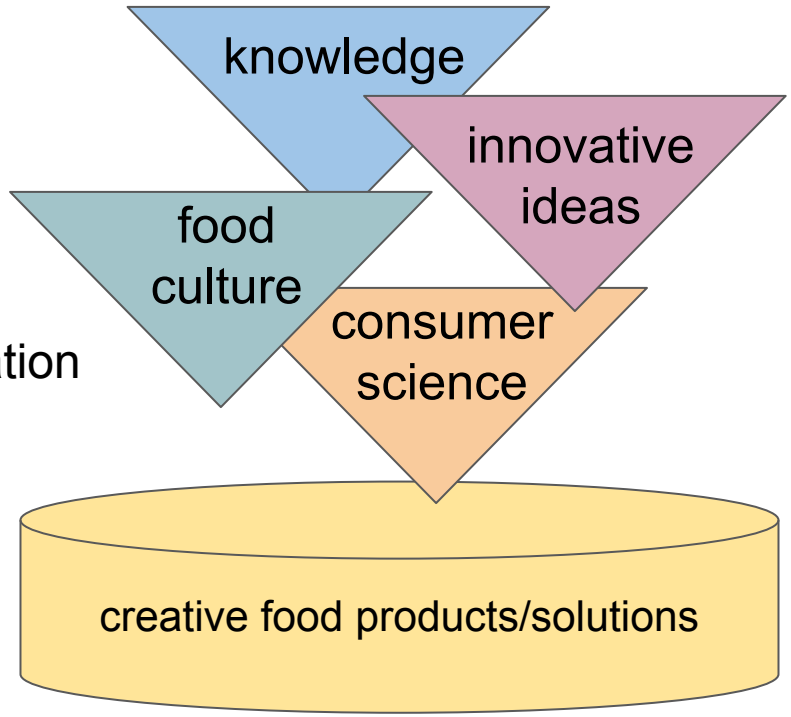
Overview:

PILLAR I - *Food Design Thinking*

PILLAR II - *Innovation*
biocatalysis (enzymes)
safety of food additives
bioprocessing, encapsulation
one-health

PILLAR III - *Food control and Instrumental analysis*



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Food Safety and Product Design

Overview:

Innovation in food additives

Omic sciences for food safety
- Fundamentals of advanced omic technologies
- Metabolomic assessment of food product safety

Enzymes and biocatalysis in food development

Nanotechnological approaches in food safety

2026/2027

Student's free choice courses → 2025/2026

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Cultural heritage and food tradition
the medieval city of Ferrara



the marvelous House of Este banquet (1529)



Cristoforo di Messisbugo the Este court carver 15th century - 1548



the moated Este castle

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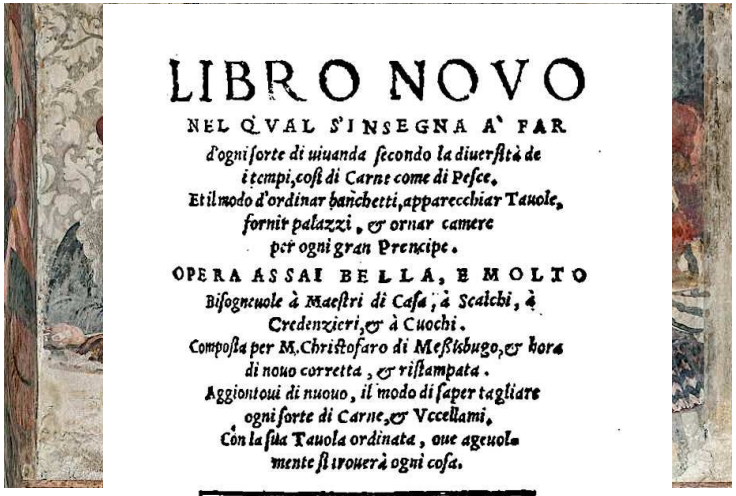

the new book where he described how to prepare almost every kind of food



Cristoforo di Messisbugo



Banquets. Compositions of food and how to prepare the table

sturgeon
caviar





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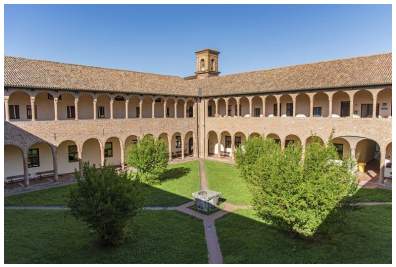





- Founded in 1391 (1 century before Columbus expedition to Americas)
- Two famous students were in Ferrara:
  Nicolaus Copernicus
  (mathematician and astronomer, pioneer of the scientific revolution
  and Paracelsus
  (pioneer of the renaissance medical revolution and toxicology)
- More than 28,000 students enrolled in 65 courses (BSc, MSc, postgraduate, I and II level masters, PhD, medical specialization, etc.)
- 14 Departments, 37 Research and/or Higher education Centers
- +650 faculty members, + 350 researchers
- The University motto is *"Ex Labore Fructus"* → The fruits of labor





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<u>Interaction between food products and human microbiota</u> - 6 ECT (including 1 ECT practical activities)

Course Overview: role of human microbiota in health and disease and its relationship with the microbiological aspects of food safety. Topics include microbial ecology, molecular approaches to studying microbiota, foodborne pathogens, regulatory frameworks, and the influence of diet on microbiota composition.

TOPICS:

Microbiological Quality and Safety in Food Systems

(Functional classification, overview of foodborne infections and poisoning, European legislation and regulatory frameworks, Good Hygiene Practices (GHP) and Hazard Analysis Critical Control Point (HACCP), microbiological limits, sampling plans, and safety criteria)

Human Microbiota and Diet

(Molecular approaches, microbial ecology and oral microbiota, impact of diet on intestinal microbiota composition, effects on host health)

Human Microbiota and Health

(stability, disturbance, resistance, resilience of human microbiota and dysbiosis, impact of dietary carbohydrates on intestinal microbiota composition, association between intestinal microbiota and obesity, understanding reactions catalyzed by intestinal microbiota on food molecules

Relationship between Diet, Microbiota, and Human Health

Analysis of case studies (high-fat diet and liver cancer, dietary fiber and protection from intestinal polyps, refined inulin and liver cancer,
effects of carnitine/choline on atherosclerosis, impact of artificial sweeteners on glucose intolerance, promotion of colitis and metabolic syndrome by food emulsifiers, relationship between milk fats and intestinal inflammation, the case of melamine)

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Geochemical and isotopic fingerprints as tools for food traceability and food safety -

6 ECT (including 1 ECT practical activities)

Course Overview: basic geochemistry of waters, soils and plants from an elementary and isotopic point of view, detecting the elemental and isotopic signature for investigating the origin of foods and their authenticity, carbon and nitrogen cycles, storage of soil texture, seasonal changes and soil microbial communities, biogeochemical cycles and relationships with the geo - lithological environment, carbon exchanges between soil and atmosphere and the isotopic balance of organic matter pools to quantify the alterations due to changes in climate or land use and anthropogenic impact.

TOPICS:

- Food authentication: techniques and prospects, authenticity vs traceability, authentication technologies;
- Food frauds in the global food system: case studies, tackling food fraud through technology;
- Analytical Methodology in food authenticity and traceability;
- Theory of Isotopes: nature and formation of Isotopes
- Stable Isotopes and the Hydrosphere (The Importance of Water; Water on Earth, Fractionations During Evaporation and Condensation, Rayleigh Distillation, Effects of Evaporation, Isotope Mixture)
- The Biosphere
- Nontargeted fingerprinting approaches and future prospects



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Upcycling for safe and sustainable design of food ingredients - 6 ECT (including 1 ECT practical activities)

Course Overview: knowledge and skills necessary to design food ingredients in a safe and sustainable manner through upcycling processes. The emphasis is on utilizing waste or by-products from food production and transforming them into valuable ingredients while adhering to safety and sustainability principles. The course will foster understanding of circular economy concepts, innovative processing techniques, regulatory considerations, and the environmental impact of upcycling in food production.

TOPICS:

Safe and Sustainable by Design: principles and core concepts: regulatory frameworks and international standards for food safety and sustainability.

Upcycling in the food industry: processes and technologies to recover and repurpose food waste and by-products.

Innovative design for functional food ingredients: Case studies and practical applications of upcycled ingredients in the food industry.

Food safety and regulatory aspects: Understanding legal requirements, risk assessment, and quality control.

Sustainability metrics and life cycle analysis (LCA): Tools for assessing the environmental, social, and economic impact of upcycled ingredients.

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Designing functional foods for human health - 3 ECT

Course Overview: basic knowledge about the design, production and packaging of functional foods products and their EU regulation. In addition, the student will be provided with in-depth understanding and applying the biopharmaceutic principles and evaluating the technological aspects involving the functional food product, their release and packaging.

TOPICS:

- Functional food definition and national and international regulation (EU, USA, Italy)
- Health claims of functional food
- Antinutritional factors
- Preformulation
- Introduction to biopharmaceutics
- Conventional products (i.e. powder, granules, capsules, tablets, solutions, dispersions, gels, solutions, disperse systems)
- Supramolecular systems (i.e. liposomes, cyclodextrins, microparticles)
- Impact of food processing
- Mixing and milling
- Coating
- Encapsulation
- Desiccation
- Lyophilization
- Packaging
- Food labelling system

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Consumer perception and attitudes - 3 ECT

Course Overview:
Food psychology and customer's subjective views, feelings, and beliefs about food products.Beliefs, feelings, and intentions that influence how people interact with food products, shaping their buying choices. Consumer behavior and marketing strategies. Methods to measure consumer perception and attitude, including surveys, focus groups, and social monitoring.

TOPICS:

Introduction to consumer behaviour
Perception and attitudes
Motivation and social norms
Practical applications.




finalmente
Cattedrale








IL PALIO DI FERRARA



