

# EPIDEMIOLOGY

Overall objective(s)	Title	Specific objectives
<b>Introduce students to the diverse fields of epidemiology</b>	<ul style="list-style-type: none"> <li>Descriptive Epidemiology</li> <li>Analytical Epidemiology</li> </ul>	<ul style="list-style-type: none"> <li>Differentiate Descriptive from Analytical Epidemiology</li> <li>Identify the benefits and limitations of Epidemiology</li> <li>Compare Applied Epidemiology to Human and Animal Health (similarities and differences)</li> </ul>
<b>Discover and explore critical and contextual outlooks of Epidemiology</b>	<ul style="list-style-type: none"> <li>Critical reading of articles</li> </ul>	<ul style="list-style-type: none"> <li>Analyse factually and rationally the strengths and weaknesses of an article (clarity, accuracy, ad hoc methods, documented discussion, writing standards compliance, etc.)</li> <li>Define an outcome measure</li> </ul>
<b>Complete basic training in Descriptive Epidemiology</b>	<ul style="list-style-type: none"> <li>Data sources</li> <li>Descriptive statistics</li> <li>Indicators</li> </ul>	<ul style="list-style-type: none"> <li>Identify data sources</li> <li>Implement basic tools of Descriptive Epidemiology</li> <li>Calculate the main indicators for population health measurements</li> </ul>
<b>Analytical Epidemiology</b>	<ul style="list-style-type: none"> <li>Bivariate statistics</li> </ul>	<ul style="list-style-type: none"> <li>Implement the basic tools of bivariate statistics</li> </ul>
	<ul style="list-style-type: none"> <li>Causation/Measure of association</li> </ul>	<ul style="list-style-type: none"> <li>Differentiate between statistical association and causation</li> <li>Define the notion of risk factor</li> <li>Quantify risk</li> </ul>
	<ul style="list-style-type: none"> <li>Multivariate approach</li> </ul>	<ul style="list-style-type: none"> <li>Understand the relevance of multivariate approaches</li> <li>Understand the notions of Confounding and Adjustment</li> <li>Understand Logistic Regression basics</li> </ul>

**EPIDEMIOLOGY**

Overall objective(s)	Title	Specific objectives
Complete basic training in Descriptive and Analytical Epidemiology	<ul style="list-style-type: none"> <li>Sampling</li> </ul>	<ul style="list-style-type: none"> <li>Identify population source, target population and population study</li> <li>Calculate sample size</li> <li>Define survey accuracy</li> <li>Understand the relevance of random sampling</li> </ul>
Complete basic training in Analytical Epidemiology	<ul style="list-style-type: none"> <li>Study types</li> </ul>	<ul style="list-style-type: none"> <li>Distinguish between different types of epidemiologic studies, their benefits and limits</li> </ul>
Discover and explore quantitative synthesis methods for individual epidemiological test results	<ul style="list-style-type: none"> <li>Meta-analysis</li> </ul>	<ul style="list-style-type: none"> <li>Interpret meta-analysis results</li> </ul>
Introduce students to the principle paths in Epidemiology	<ul style="list-style-type: none"> <li>Epidemiology paths</li> </ul>	<ul style="list-style-type: none"> <li>Know the different paths and be able to interpret them</li> </ul>
Discover and explore a method reducing Recruitment Bias	<ul style="list-style-type: none"> <li>Propensity Score</li> </ul>	<ul style="list-style-type: none"> <li>Implement matching methods to Propensity Scores</li> </ul>
Complete basic training in Descriptive Epidemiology	<ul style="list-style-type: none"> <li>Se/Sp</li> <li>PPV/NPV</li> <li>ROC Curve</li> </ul>	<ul style="list-style-type: none"> <li>Evaluate and interpret results of a diagnostic test</li> </ul>

## EPIDEMIOLOGY

Overall objective(s)	Title	Specific objectives
<b>Discover and Explore Epidemiological Modeling</b>	<ul style="list-style-type: none"> <li>Introduction to Epidemiological Modeling (SIR model)</li> </ul>	<ul style="list-style-type: none"> <li>Apprehend the relevance of Epidemiological Modeling in order to understand the manners in which an infectious disease is propagated within a population</li> </ul>
<b>Discover and Explore «advanced methods» of Epidemiology</b>	<ul style="list-style-type: none"> <li>Survival analysis</li> <li>Chronological series</li> <li>Quasi-experimental tests</li> </ul>	<ul style="list-style-type: none"> <li>Integrate a temporal dimension when analysing the arise of an event (disease, death, recovery...)</li> </ul>
	<ul style="list-style-type: none"> <li>Qualitative approaches</li> </ul>	<ul style="list-style-type: none"> <li>Measure the quality of life</li> <li>Validate and employ a subjective measurement scale</li> </ul>

# BIOLOGICAL RISQUES

Overall objective(s)	Title	Specific objectives
Enable students to analyse the emergence of infectious diseases	<ul style="list-style-type: none"> <li>Factors of PID eruption</li> </ul>	<ul style="list-style-type: none"> <li>Inventory the main factors of PID eruptions</li> </ul>
	<ul style="list-style-type: none"> <li>Zoonotic agent reservoirs</li> </ul>	<ul style="list-style-type: none"> <li>Identify the diversity of zoonotic agent reservoirs</li> <li>Explain the functioning and mechanisms of persistent agents</li> </ul>
Discover and Explore the tools and methods of infectious disease and eruption surveillance (Forecast – monitoring – surveillance)	<ul style="list-style-type: none"> <li>Knowledge of surveillance systems through examples of human/ animal infectious diseases (<i>West Nile disease, tuberculosis, rabies, etc.</i>)</li> </ul>	<ul style="list-style-type: none"> <li>Acquire the basics of economic decision support (cost-benefit analysis of the surveillance network)</li> </ul>
Discover and explore the differences between foodborne or non-foodborne zoonosis surveillance systems around the world	<ul style="list-style-type: none"> <li>Presentation of 3 main zoonosis surveillance systems in North America, India, Europe and Africa</li> </ul>	<ul style="list-style-type: none"> <li>Analyse a situation regarding 3 zoonosis in different regions of the world</li> <li>Understand the organisation of their surveillance, their struggle and identify the constraints and the limits of each region</li> </ul>
Discover and explore risk assessment tools and investigation	<ul style="list-style-type: none"> <li>Contribution of molecular biology methods to epidemics investigation and infectious disease surveillance</li> </ul>	<ul style="list-style-type: none"> <li>Identify the contribution of molecular biology methods to epidemics investigation and infectious disease surveillance</li> </ul>
	<ul style="list-style-type: none"> <li>Infectious disease modeling (e.g. HEV)</li> </ul>	<ul style="list-style-type: none"> <li>Comprehend the value of SIR models for infectious disease management</li> </ul>

**BIOLOGICAL RISQUES**

Overall objective(s)	Title	Specific objectives
<b>Discover and explore QRA in microbiological food safety</b>	<ul style="list-style-type: none"> <li>• Introduction to the Risk Assessment approach and food safety management based on Risk Assessment - tools (ex: ALOP, FSO, microbiology standards...)</li> </ul>	<ul style="list-style-type: none"> <li>• Identify the Risk Assessment approach in microbiological food safety</li> <li>• Recognize European and international principles of Safety Management</li> </ul>
	<ul style="list-style-type: none"> <li>• Effects, process and composition models regarding food safety</li> </ul>	<ul style="list-style-type: none"> <li>• Develop Projected Microbiology models on simple case studies</li> </ul>
	<ul style="list-style-type: none"> <li>• Risk quantification: practical implementation of simple examples</li> </ul>	<ul style="list-style-type: none"> <li>• Create a QRA model</li> <li>• Implement QRA model (Monte Carlo simulation)</li> <li>• Interpret the outputs (sensitivity analysis)</li> </ul>
<b>Discover and explore biological hazard ranking – example : pigmeat</b>	<ul style="list-style-type: none"> <li>• Classification of biological hazards in food</li> </ul>	<ul style="list-style-type: none"> <li>• Understand the difference between hazard and risk via an example</li> <li>• Identify the methodical steps of hazard analysis and ranking tools</li> </ul>
<b>Discover and explore Antibiotic Resistance</b>	<ul style="list-style-type: none"> <li>• Triad Environment: Man-Animal and the use of antibiotics</li> </ul>	<ul style="list-style-type: none"> <li>• Analyse bacterial resistance</li> <li>• Identify the epidemiological situation of MRSA and BLSE in humans and animals</li> </ul>
<b>Discover and explore the contribution of animal models for the study of infectious diseases</b>	<ul style="list-style-type: none"> <li>• Acinetobacter Baumannii to Pneumonia</li> </ul>	<ul style="list-style-type: none"> <li>• Recognize the value of an animal model within infectious disease studies</li> </ul>

# CHEMICAL RISKS

Overall objective(s)	Title	Specific objectives
Introduction to risk analysis	<ul style="list-style-type: none"> <li>Chemical risk analysis indicators</li> </ul>	<ul style="list-style-type: none"> <li>Identify hazards</li> <li>Rank risks</li> <li>Propose solutions via official documents (a sole document containing hazard identification, risk classification, preventive actions propositions)</li> <li>Identify the main stakeholders in the international environment</li> </ul>
	<ul style="list-style-type: none"> <li>Chemical hazards (catalogue)</li> </ul>	<ul style="list-style-type: none"> <li>Identify forbidden compounds in Animal Production (group A)</li> </ul>
		<ul style="list-style-type: none"> <li>Identify veterinary medicines in Animal Production (B1: antibacterial substances, B2: other veterinary medicines) and the main environmental contaminants (group B3)</li> </ul>
		<ul style="list-style-type: none"> <li>List endocrine disruptors</li> </ul>

**CHEMICAL RISKS**

Overall objective(s)	Title	Specific objectives
<b>Introduction to risk analysis methods and tools</b>	<ul style="list-style-type: none"> <li>General principles of Toxicology</li> </ul>	<ul style="list-style-type: none"> <li>Explain TVR fixation modalities</li> <li>Assess the quality of studies</li> <li>Select a pivotal study</li> </ul>
	<ul style="list-style-type: none"> <li>Statistical aspects and modeling</li> </ul>	<ul style="list-style-type: none"> <li>Adopt a critical perspective on TVR determination by understanding mathematical models (awareness)</li> </ul>
	<ul style="list-style-type: none"> <li>Metrology</li> </ul>	<ul style="list-style-type: none"> <li>Maintain a critical attitude regarding set of analytical data (analytical quality, method performances, i.e. LOD, LOQ, accuracy, blank management...)</li> </ul>
	<ul style="list-style-type: none"> <li>Exposure assessment (1 day)</li> </ul>	<ul style="list-style-type: none"> <li>Use general principles of exposure calculations</li> <li>Cross-reference data of foodstuff contamination with food habits</li> <li>Learn sources of exposure - other than dietary - (notion of total exposure: professional, occupational...)</li> </ul>

## HEALTH ORGANISATION AND POLICIES, MANAGEMENT AND COMMUNICATION

Overall objective(s)	Title	Specific objectives
<b>Discover and explore international health security organisations</b>	<ul style="list-style-type: none"> <li>• Organisation of international systems</li> </ul>	<ul style="list-style-type: none"> <li>• Identify how important institutions function (WHO, CDC...)</li> <li>• Compare the operation modes of international systems</li> </ul>
	<ul style="list-style-type: none"> <li>• Food laws</li> </ul>	<ul style="list-style-type: none"> <li>• Acquire general knowledge of the Food laws</li> </ul>
<b>Know the Public Health regulatory agencies and their modes of operation</b>	<ul style="list-style-type: none"> <li>• French agencies (HAS, ANSM, HCSP), Ministries (DGOS, DGS) of Human Health</li> </ul>	<ul style="list-style-type: none"> <li>• Identify the French Public Health Planning agencies and their international counterparts</li> <li>• Identify the relations and organization of agencies/ ministries using as an example the alert “feeding bottles and Ethylene oxide”</li> </ul>
<b>Crisis management</b>	<ul style="list-style-type: none"> <li>• Animal health crisis</li> </ul>	<ul style="list-style-type: none"> <li>• Analyse crisis management methods</li> </ul>
<b>Manage an interdisciplinary working team</b>	<ul style="list-style-type: none"> <li>• Project management tools</li> </ul>	<ul style="list-style-type: none"> <li>• Use the PERT and GANTT methods</li> <li>• Manage stress and conflicts</li> <li>• Identify the decision-making mechanisms</li> </ul>
	<ul style="list-style-type: none"> <li>• Intercultural communication</li> </ul>	<ul style="list-style-type: none"> <li>• Master the basis of a team dynamic</li> <li>• Master the basis of an intercultural team dynamic</li> </ul>
	<ul style="list-style-type: none"> <li>• Positions and behaviours in a working team</li> </ul>	<ul style="list-style-type: none"> <li>• Know oneself</li> <li>• Define the role of the manager and of the leader</li> <li>• Identify the motivation leverages for a team</li> <li>• Choose the control means within a team</li> </ul>

## HEALTH ORGANISATION AND POLICIES, MANAGEMENT AND COMMUNICATION



# PRODUCTION SYSTEMS

Overall objective(s)	Title	Specific objectives
<p><b>Identify the specificities of large production systems</b></p>	<ul style="list-style-type: none"> <li>• Features and operations of the following animal chains: dairy cattle, suckler cow, pork, poultry meat, laying poultry</li> <li>• Features and operations of the farming/slaughtering/processing parts</li> </ul>	<ul style="list-style-type: none"> <li>• Understand the main characteristics of the livestock sector in France and in Europe</li> <li>• Understand the basis of farm running and slaughtering/processing tools operating through farm (dairy cattle, pig, poultry) and slaughterhouse (cattle, poultry) visits as well as educational film viewings</li> </ul>
<p><b>Analyse how industries are structured and operate and their implication in animal and human health</b></p>	<ul style="list-style-type: none"> <li>• Contribution of a production chain method</li> <li>• Implementation of this method via case scenarios and case studies</li> </ul>	<ul style="list-style-type: none"> <li>• Know how to approach a production chain</li> <li>• Understand the complexity of production chains (including on an international level)</li> <li>• Understand the stakes involved in each part of the production chain (distributed risks, limited leeway...)</li> <li>• Establish existing, or needed, connections between different the links related to animal and human health control</li> <li>• Identify the animal and public health management decision-makers in the production chain sector</li> <li>• Propose actions to take in order to resolve a problem in the selected industry</li> <li>• Implement the method via case scenarios and two case studies: health issues linked to raw milk cheeses; health issues linked to the rabbit sector</li> </ul>

**PRODUCTION SYSTEMS**

Overall objective(s)	Title	Specific objectives
<b>Understand MAN-IMAL global stakes and their variations in different countries</b>	<ul style="list-style-type: none"> <li>Farming-society controversies in the students' countries of origin</li> <li>Diversity of production chains throughout the world. Comparison France/Europe/rest of the world (USA and developing countries)</li> </ul>	<ul style="list-style-type: none"> <li>Understand the different MAN-IMAL stakes according to social/cultural/production contexts worldwide</li> <li>Understand the diversity and operating principles of animal production chains in France and around the world</li> </ul>
<b>Place MAN-IMAL global stakes within a context of sustainable development of animal production chains</b>	<ul style="list-style-type: none"> <li>Sustainability of livestock farming. Assessment. Place/role of health</li> <li>Life-cycle analysis</li> </ul>	<ul style="list-style-type: none"> <li>Master the basics of sustainable development and of its assessment within production chains; understand the role of health within a context of sustainable development of production chains</li> <li>Master life-cycle analysis</li> </ul>

## **RISK AND NUTRITIONAL CONTAMINATIONS/TRANSFERS**

Title	Specific objectives
<b>Nutritional balance, recommended dietary allowance, satiety regulations, physiology of eating behaviour, adult eating disorders</b>	<ul style="list-style-type: none"><li>• Master the nutritional transfer concepts in overweight disorders</li></ul>
<b>Diabetes, physiopathology and health consequences, nutritional prevention and intervention</b>	<ul style="list-style-type: none"><li>• Master the nutritional transfer concepts involved in Diabetes mellitus type 2</li></ul>
<b>Atherosclerosis and cardiovascular disease, physiopathology, health consequences, nutritional prevention, hypolipemiant</b>	<ul style="list-style-type: none"><li>• Master the nutritional transfer concepts at the origin of cardiovascular diseases</li></ul>
<b>Malnutrition, elderly nutrition, enteral and parenteral nutrition, anorexia</b>	<ul style="list-style-type: none"><li>• Master the concepts of intake insufficiencies and support strategies</li></ul>

## INTERDISCIPLINARY SEMINARS

- Biology of vectors and vector-borne diseases
- HEV risk assessment
- **ies:** Surveillance and control systems in different countries/regions (Brazil, North America, France, Africa, Asia)
- Enteric viruses and public health; management of a foodborne illness outbreak