COMPLEMENTARY FOOD ANALYSIS

Study Cycle: MIMV **Curricular Year: 3-5th** **Semester: 1/2nd** **Optional ECTS: 2.5**

Lecturers: Marília Ferreira (CCP), Teresa Semedo Lemsaddek (R)

1. Contact hours: Theoretical - 14; Practices - 14; Total - 28

2. Goals:
Ensuring the quality and safety of food requires a proactive approach within the agri-food system, with laboratory analysis being a key method to monitor these procedures. This curricular unit aims to provide comprehensive knowledge in molecular biology and OMICS technologies, specifically applied to food science, also known as *FoodOMICs*. Students will learn to extract DNA from various food matrices and identify potentially pathogenic microorganisms using molecular biology techniques. Additionally, the unit covers data analysis and the interpretation of results. Emphasis will also be placed on developing critical thinking skills and integrating the acquired knowledge for future applications in food quality control. This will enable students to meet the growing consumer demands for comprehensive information on food products, ensuring a safe and balanced diet.

3. Program:
Theoretical – The importance of detecting and/or quantifying microorganisms present in food (technological, spoilage and/or pathogenic). Introduction to OMICS technologies (metagenomics, proteomics, metabolomics). Sampling and sample preparation for molecular analysis. Detection methods, with a focus on those based on PCR amplification. Validation and detection limits. Data analysis, including reproducibility and repeatability.
Practical – Sampling. Extraction of DNA from different food matrices (dairy products, meat, water and fishery products). Molecular detection of pathogenic bacteria (*Salmonella*, *E. coli*, *Listeria monocytogenes*) in the foods under study. Analysis and discussion of the results.

4. Bibliography:
Copies of files/slides presented in class, scientific and technical articles.
Álvarez-Rivera, G., Valdés, A., León, C., & Cifuentes, A. (2021) in Foodomics: Omic Strategies and Applications in Food Science, ed. J. Barros-Velázquez, The Royal Society of Chemistry, 2021, ch. 1, pp. 1-53.
Andjelković, U., Šrajer Gajdošik, M., Gašo-Sokač, D., Martinović, T., & Josić, D. (2017). Foodomics and food safety: Where we are. *Food Technology and Biotechnology*, *55*(3), 290-307.
Barros-Velázquez, J. (Ed.). (2021). *Foodomics: Omic Strategies and Applications in Food Science, The Royal Society of Chemistry, 2021, pp. P001-P006*
Cifuentes, A. (2020). *Comprehensive foodomics*. Elsevier Science Publishing. ISBN: 9780128163955
Ellis, D. I., Muhamadali, H., Allen, D. P., Elliott, C. T., & Goodacre, R. (2016). A flavour of omics approaches for the detection of food fraud. *Current Opinion in Food Science*, *10*, 7-15.
Srinivasan, M. (2020). Foodomics: The what, why and how of it. *Metagenomic Systems Biology: Integrative Analysis of the Microbiome*, 185-205.
Walsh, A. M., Crispie, F., Claesson, M. J., & Cotter, P. D. (2017). Translating omics to food microbiology. *Annual Review of Food Science and Technology*, *8*(1), 113-134.
Xu, Y. J. (2017). Foodomics: A novel approach for food microbiology. *TrAC Trends in Analytical Chemistry*, *96*, 14-21.

5. Evaluation:
A written exam (75%) in which all the subjects taught will be evaluated and which includes quick answer questions (multiple choice, true and false and fill in the blanks), short answer and development, and a group work in the form of a report (25%).