COURSE: AGR0238 - ANALYSIS, QUALITY AND DEVELOPMENT OF FOOD PRODUCT

ACADEMIC YEAR: 2019/2020

TYPE OF EDUCATIONAL ACTIVITY: Characteristic

LECTURER: Nicola CONDELLI

e-mail: nicola.condelli@unibas.it	web:
phone: +39.0971205571	mobile (optional): +39.3477018807

Language: Italian

ECTS: 9 (8 Lectures + 1 practicals)	n. of hours: 80 (64h lesson and 16h tutorials/practice)	Campus: Potenza Dept./School: Scuola di Scienze Agrarie, Forestali, Alimentari ed Ambientali (SAFE) Program: Food Science and Technology	Semester: II

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

The course aims to provide all information necessary to provide a critical approach in the implementation of analytical methods used for the verification of compliance and quality of food products and a lot of information required in the development of new food product.

- o **knowledge and understanding:** Knowledge and understanding of the Principles of instrumental analytical techniques used for the assessment of food quality in terms of chemical composition of food with particular reference to the nutritional and health benefits. Analytical methods used in the characterization, in the control of food quality and food safety assessment. Practical application of sensory analytical methods specific for various foods products used in the sensory characterization and in the evaluation of consumer preference. Basic knowledge necessary for the acquisition, management and statistical analysis of analytical data. Food production processes (even complex and innovative). Knowledge necessary to solve problems related to technological aspects, as well as to quality and shelf-life characteristics of food and plant sanitation aspects. Knowledge and comprehension of the aspects related to food product development.
- o **applying knowledge and understanding**: Knowing how to choose the analytical methods based on the type of analysis: verification of compliance with legal requirements or quick check process; Being able to program a complete analytical procedure and to implement a sampling methodology; Knowing how to use and interpret the results by using basic statistical methods as t-tests, descriptive statistics, analysis of variance. Be able to design the various stages of the development of a novel food.
- o **making judgements**: Ability to identify the most effective tools for chemical, nutricional and sensory quality assurance in the development of new products and processes and in the improvement of existing ones.
- o **communication skills**: Ability to communicate the impact of chemical composition and sensory caractheristic on food quality and safety to both non-technical and technical audiences.
- o **learning skill**: Ability to access sources of statistical data relevant to quality assurance, to understand and summarize the data. Ability to access documentation and information sources on food chemical, nutritional and sensory quality by using technical and scientific literature.

PRE-REQUIREMENTS

To understand the material presented in this course the following knowledges and skills are needed: general and inorganic chemistry, organic chemistry, food production and composition,

SYLLABUS

The group is divided in 9 teaching blocks.

Analysis and food quality
Block 1. (8h, lectures)
Basic principles of spectroscopic techniques used for the assessment of the quality of food in terms of food chemistry with particular reference to the nutritional and health benefits. Basic principles and application protocols of spectroscopic techniques: UV-Vis, NIR and MIR, Atomic absorption.

Block 2. (8h, lectures)
Basic principles of chromatographic techniques used for the assessment of food quality in terms of chemical composition of food with particular reference to the nutritional and health benefits. Basic principles and application protocols of chromatographic techniques: HPLC and GC.

Block 3. (8h, lectures)
Analytical methods used in the product characterization, quality control of food with particular reference to those used for the evaluation of the nutritional composition, for the nutraceutical characterization, for the evaluation of the antioxidant power

Block 4. (8h, lectures)
Analytical methods used in the control of food healthiness with particular reference to those used for the determination of agricultural chemicals, mycotoxins and allergens. Examples of analytical protocols. Immunoenzymatic assays: ELISA assays and kits for process/product control.

Block 5. (8h, lectures)
Sensory analysis. Recall of the basic concepts: discriminating, analytical and descriptive methods. Advanced methods: CATA, Time Intensity and TDS. Examples of specific methods used for sensory characterization and for the assessment of consumer preference of various food products.

Block 6. (16h, Practical activity)
Practical experience in the laboratory by the application of instrumental and sensory analytical methods discussed during frontal lessons. Practical application of spectrophotometric and chromatographic methods. Development and application of a sensory analysis procedure.

Food Development
Block 7. (8h, lectures)
Fundamental concepts for process innovation: generation, study and validation of concepts; systematic variation of concept elements and approach to joint analysis. Building up of a research and development project. Development of sampling plans and statistical analysis of results (descriptive statistics, t-test, analysis of variance).

Block 8. (8h, lectures)
Innovative technologies used in the production of foods and in the recovery of components from food matrices (high pressure, pulsed electric fields, SFE).

Block 9. (8h, lectures)
Functional foods, nutraceuticals, novel foods: definitions, regulatory aspects, nutritional and health aspects, technologies, market opportunities. Application examples for the development of functional foods

TEACHING METHODS
The course is based on 9 teaching blocks and it includes 64 h lectures and 16 h practical tutorials, concerning the main physical-chemical analysis discussed during lectures.

EVALUATION METHODS

The aim of examination is to verify the student achieved skills as previously listed and to verify their skills and abilities acquired for the various topics discussed and dealt with during the lectures and laboratory exercises.

The assessment of learning consists of three tests as described below

Multiple choice written exam: it will be organized in two tests consisting of 15 multiple choice questions. The first test will be performed halfway through the course and the second one during the last lesson on the calendar. This verification method contributes to 20% of the final grade (maximum 6 points will be awarded)

Discussion of a paper: the students, divided into groups, will have to prepare a paper concerning the practical application of the methods used in the control of the safety and quality of a food product chosen by the teacher. The works will be illustrated to the teacher and to the other groups, providing for the use of a power point presentation or other methods of communication. This verification method contributes to 20% of the final grade (maximum 6 points will be awarded).

Oral exam: during the oral examination the student will have to answer three questions on three topics chosen among all the contents of the course. The first question will concern a topic chosen by the student. This method of verification contributes to 60% of the final grade (maximum 18 points will be awarded).

The final grade will be given by the sum of the scores of the three tests.

Students who want to take the exam without attending the course will be evaluated through an oral exam aimed at verifying the skills and abilities acquired for the various topics discussed and treated during the lectures and laboratory exercises.

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

1. **Reference teaching**
   1. Presentations used during the lectures that will be provided to students in pdf format;
   2. Reference texts that specifically are the following:

   Analysis and food quality

   Cabras, P., Tuberoso, C., ANALISI DEI PRODOTTI ALIMENTARI (2014). Ed. Piccin Nuova Libraria S.p.A.

   Nielsen, S., FOOD ANALYSIS Third Edition (2003). Ed. Springer

   Società Italiana di Scienze Sensoriali, ATLANTE SENSORIALE DEI PRODOTTI ALIMENTARI (2012). Ed. Tecniche Nuove

   Food Development

   Baker, R.B., Wong Hahn, P., Robbins, K.R. FUNDAMENTAL OF NEW FOOD PRODUCT DEVELOPMENT. Elsevier, The Netherlands.

   Porretta, S., Moskowitz, H.R. ELEMENTI E CONCETTI NELLO SVILUPPO DI ALIMENTI. Chiriotti Editori, Pinerolo, Italia.

2. **Specific teaching material**
   1. Articles published in specialized journals
3. **On line teaching material**
   1. The handouts, presentations used during the lessons, scientific publications, exercises protocols and examples of statistical analysis will be uploaded to a dropbox archive shared with all the students attending.

INTERACTION WITH STUDENTS

During the presentation of the course are provided the contact details of the teacher and acquired those of the students in order to facilitate the exchange of information. At the end of each lesson is left a space of time available to students for any questions. For more information or for any other needs, the lecturer will be available to receive students on Monday (11.30-13.30), Wednesday (11.30 -13.30) in room n. 210 of SAFE.

SCUOLA DI SCIENZE AGRARIE, FORESTALI, ALIMENTARI ED AMBIENTALI

EXAMINATION SESSIONS (FORECAST)[1]
17/07/2020, 18/09/2020, 16/10/2020, 13/11/2020, 18/12/2020, 17/01/2021, 13/02/2021, 14/03/2021, 13/04/2021, 15/05/2021, 19/06/2021

EVALUATION COMMITTEE
Dr. Nicola CONDELLI (President), Prof. Fernanda GALGANO (member), Dr. Marisa C. Caruso (replacement member)

SEMINARS BY EXTERNAL EXPERTS   SI   X NO

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[1] Subject to possible changes: check the web site of the Teacher or the Department/School for updates.