Florence University of the Arts (FUA) is an academic institution for study abroad in Florence, Italy. FUA collaborates with The American University of Florence (AUF), an international university offering US-style undergraduate and graduate degrees, in a cooperation to offer study abroad programs with a diverse breadth and depth of academic curriculum.
FUA study abroad programs may include AUF offerings, which are US-aligned in terms of higher education standards as per the university's institutional structure. Common courses offered by FUA and AUF have been jointly selected by both institutions as eligible for mutual recognition and delivery. As such, equal academic standards, credibility, and outcomes are vetted by the Academic Offices of the institutions for all courses and syllabi offered in the study abroad program.

SCHOOL OF FOOD AND WINE STUDIES
DEPARTMENT OF CULINARY ARTS
COURSE TITLE: PRECISION COOKING AND TEXTURE DEVELOPMENT
COURSE CODE: FWCAPC490
3 semester credits

1. DESCRIPTION

The course is divided into three phases and explores stimulating applications of contemporary cuisine. Precision cooking and texture development apply the latest scientific discoveries to food production and may require special instruments for the achievement of specific results. This course focuses on techniques that can be available in a professional environment and allow chefs to development their creativity in order to reach new and sometimes unexpected results.

Phase 1, Temperature Application: This phase explores the possible applications in which precise and specific temperatures play a fundamental role. The microbiology as well as the sanitation practices for precision and low temperature cooking will be covered, with a complete overview of contemporary methods, equipment, and procedures used in contemporary kitchens and in food production labs. Special emphasis will be placed on sous-vide cooking through the use of the immersion circulator, applications of liquid nitrogen for different purposes other than freezing, and stimulating effects of carbonation on food flavor perception.
Phase 2, Gels and Thickening Agents: This phase examines how contemporary chefs and food technologists use ingredients in ways that earlier generations would have never imagined. Topics will analyze the increasing use of ingredients such as thickening and gelling agents in order to create sauces with unexpectedly smooth textures, hot and cold gels, firm coating gels, and methylcellulose gels. With the support of a chemist, specific additives will be evaluated, discussed, and tested.
Phase 3, Gases and Air-Based Preparations: This phase focuses on contemporary techniques of texture changes obtained by incorporating specific gases into foods in order to modify familiar textures, improve presentation methods, and serve unusual and contemporary dishes. Items such as foams, froth, and puffed snacks will be analyzed. Students will examine and test diverse types of foams, both hot and cold with different foaming agents from animal and vegetable sources, as well as learn how to produce light foams, thick fine-textured foams, textured snacks, airs, and froths.

This course consists of experiential learning hours with our Community Engagement Member Institutions (CEMI). CEMI are dynamic learning environments created to foster learning through a structured interaction with the community. In addition to regular lecture hours, students will be involved in learning by doing through real projects and integration with the local population and territory in order to remove cultural and learning barriers as well as to develop a strong likelihood for success in life. The experiential learning hours are fully supervised by instructors who track students step by step during their learning experience, monitor and advise according to student needs, and support student initiative. This unique learning model allows students to benefit from an all-encompassing educational experience based on theory and practice in real enterprises, learning of

comprehensive operational processes, problem-solving, leadership, and management.

2. OBJECTIVES

The objective of this course is to introduce students to the frontiers of contemporary cookery through a full immersion in the science of cooking. Over the past decades, culinary practice has undergone transformative changes comparable to previous gastronomic revolutions. Students will gain hands-on experience with equipment and materials typically encountered only in textbooks or media, while exploring the vast potential of modernist cuisine. The course highlights how specific techniques and ingredients can alter flavors, textures, and visual presentation, expanding the expressive possibilities of gastronomy.

Upon successful completion of the course, students will be able to:

- Recognize the role of chemistry in every culinary preparation, whether rooted in traditional methods or contemporary techniques.
- Understand that modernist applications represent an evolution of cooking rather than a departure from its foundations.
- Evaluate the impact of precise temperature control on achieving textures and flavors previously unattainable with conventional methods.
- Employ natural additives to create dishes with innovative textures, flavors, and thermal contrasts.
- Acquire technical knowledge that broadens creative expression in the kitchen.
- Assess the practical integration of these techniques into restaurant menus, recognizing their advantages in terms of both culinary innovation and food cost management.

3. REQUIREMENTS

Culinary Arts Majors only. The Science of Cooking: An Introduction to Molecular Cuisine, or equivalent.

4. METHOD

This course consists of lectures, class discussions, projects, and interaction with the local community. Mediums for instruction used will include, but are not limited to, interactive and hands-on activities which challenge thought processes, integrate relevant academic sources, may include multimedia references, propose creative problem-solving, and other appropriate forms of delivery as deemed appropriate to the course's purpose.

5. TEXTBOOK – FURTHER READINGS – RESOURCES

TEXTBOOK (Copy available at the university library):

Modernist cuisine - Myhrvold-Young-Bilet - The Cooking Lab
The textbook is mandatory for course participation and completion. Where applicable additional materials may be provided by the instructor.

FURTHER READINGS

On Food and Cooking: The Science and Lore of the Kitchen - Harold McGee - Hodder&Stoughton
The Flavor Thesaurus - Niki Segnit - Bloomsbury
Molecular Gastronomy: exploring the science of flavor - Herve This - Columbia University Press

The Science of Cooking - Peter Barham - Springer

LIBRARY

Course participants may access the campus library. Please consult the library site for resources such as collections, borrowing, scanning and wifi connection, and research:
https://www.auf-florence.org/Library/the-library/

6. COURSE MATERIALS

Professional Cooking/Baking&Pastry courses:
STUDENTS MUST ALSO ADHERE TO KITCHEN RULES OUTLINED IN THE CEMI BOOKLET

1. All students are strictly required to attend class wearing a clean uniform: the jacket provided by the institution, black pants, apron (color depending on the CA level), safety footwear, a white Chef's hat, and a set of knives. Students with long hair should tie hair back before wearing the hat. Students are not allowed to wear rings, earrings or any other visible piercings, bracelets, watches, and nail polish during lab hours. Students who are not dressed properly will not be allowed in class.
2. All students must attend class fully prepared and on time. Late students will not be accepted.
3. Carefully wash hands at the beginning of each class, before food is handled.
4. During professional cooking classes only small food tastings are allowed as the main purpose of these courses is to develop technical skills. Students are not allowed to take food out of the kitchen.
5. Students are also required to participate in a polite and responsible way. Students are not allowed to sit on the working stations. Students who disturb lessons or are disrespectful to the instructor or the other students will be asked to leave the class. Serious infractions will be evaluated by the Academic Office.
6. Cooking classes will include various tasks which all students must carry out. Classes will include all different types of recipes and students are expected to actively participate in all lessons regardless of personal likes or dislikes.
7. Each student is responsible for washing all utensils used during class and keeping the working station clean and tidy, with all the utensils as listed in the station inventory. Two students at a time will tidy up the kitchen common areas during each class.
8. Students are responsible for kitchen utensils and maintenance of the equipment. The cost of a) any missing utensil b) damages due to student carelessness will be shared by all students.
9. No visits are allowed in class at any time.
10. The use of cellular phones is not allowed within the school building.

Should students wish to store materials or equipment, lockers are available with a deposit (given back after returning the key).

7. COURSE FEES

Course fees cover course-related field learning activities, visits, and support the instructor's teaching methodologies. Book costs are not included in the course fee. If this course requires a fee, the exact amount is communicated prior to enrollment.

8. GRADING AND EVALUATION & ATTENDANCE

10% Attendance
10% Class Participation
15% Assignments
15% Practical Performances
15% On-site Supervisor evaluation

20% Final Exam
15% Final Project

The above grade breakdown percentages reflect the grading scale standards in the "Grading and Evaluation System" section of the catalog.

Attendance
Class participation is mandatory. Based on the hours defined in the Academic Catalog's attendance policy, students may miss up to 2 class encounters delivered as lecture hours. A third absence constitutes a course failure.

Please note that absence hours may vary according to the learning methodology, as per the academic catalog policy on credit hours:
https://catalog.auf-florence.org/standard_regulation

9. EXAMS / PROJECTS / ASSIGNMENTS

Final Exam: The final exam is divided into two sections:
Part I: written test
Part II: hands-on performance

The written test is divided into three sections:
Part I: 10 Multiple choice questions. Each correct answer is worth 2 points, for a total of 20 points.
Part II: 10 short-answer questions. Each correct and complete answer (concise explanations, main ideas, key words, names, etc.) is worth 5 points, for a total 50 points.
Part III: two essay questions; each correct and complete answer is worth 15 points (based on content, vocabulary, detail, etc.) for a total of 30 points.

No pencil allowed. Blue and black pens only.
The practical test will be defined by the Chef instructor.
Further details (guidelines, grading rubric, hands-on exam) are provided in the course portal.

The final exam is cumulative and will account for the 20% of the final grade breakdown.
The time and date of the exam cannot be changed for any reason.

Final Project: The final project accounts for 15% of the final course grade. The project details will be assigned the first day of class.

Assignments: This course requires at least 3 assignments as per the course outline in the syllabus.

Assignment #1: Students are required to submit a **500-word essay on the topic: "The Evolution of Culinary Arts from Molecular Gastronomy to the Present Day.** To what extent have those revolutionary techniques become integrated into everyday culinary practices, and how are these once cutting-edge methods perceived in contemporary gastronomy?"

Assignment #2: Students are required to **design a contemporary version of a classic sauce using modernist techniques.**

Assignment #3: Students will be tasked with **preparing daily special dishes** to be served during meal services. They will work in pairs whenever possible and will receive specific guidelines and deadlines

from the Chef instructor.

Further details are provided in the course portal.

10. COURSE OUTLINE

The below list of topics does not indicate a sequence.

1. Course Introduction
Molecular gastronomy and how it changed the way we think about food - The modernist revolution and the new scientific approach to cooking
The Modernist Cuisine Manifesto - The "modernist" kitchen: how the contemporary revolution changed the kitchen layout and equipment
A new cooking vocabulary: psychological barriers at the base of the understanding of modernist revolution

Readings
TB - From origins of cooking to the modernist revolution pp. 1-6 > 82
On food and cooking - Harold McGee - INTRODUCTION pp.1-5 - THE FOUR BASIC FOOD MOLECULES Ch.15 - A CHEMISTRY PRIMER Appendix pp.811-818

2. Cryogenic freezing
Safe handling of cryogens

2.1 Advanced culinary applications of liquid nitrogen
Applications of liquid nitrogen for cooking - The effects of temperature difference on food texture: cryo-searing - Cryogenic freezing for shattering, powdering, poaching

Readings
TB pp. 2-456 / 2-463

2.2 Carbonation
Carbonating with dry-ice and carbon dioxide

Definition of carbonation - Carbonating with carbon dioxide and dry-ice: method and suggestions The chemistry of fizziness: why do our taste buds detect carbonation as sour? - The importance of temperature for carbon dioxide dissolving - Applications of carbon dioxide: carbonating liquids and solid foods - Carbon dioxide for food preservation

Readings
TB pp. 2-464 > 473

3. Sous-vide cooking applications - Immersion circulator and the cook&hold cooking method

Overview on sous vide system - Common problems when vacuum sealing food - Sous vide equipment: controlling temperature as the key to sous vide advantages on food texture - Sous vide cookers: focus on controlled water circulation
Applications of sous vide for cooking: Low-temperature meat cooking for extended time - Cooking

starchy vegetables sous vide

Readings
TB pp.4-192 > 279

4. Thickening: from reduction by concentration to modern hydrocolloids

Fluids viscosity and its relation with temperature
Factors involved in thickening a liquid: temperature, clarity, viscosity, pH, flavor release, mouthfeel, weeping
Traditional thickeners: the limit of starch for flavor release

4.1 Modern thickeners and suitable applications
Focus on: modified starches

Pre-hydrated starches for instant "pour and stir" application
Stabilizing high-fat liquids into powders
Transforming fruit purees with high water content into dehydrated crunchies or films
Focus on modified starches and proprietary products

Readings
TB pp. 4- 6 > 19 - TB pp. 4-30 > 37

4.2 Modern thickeners and suitable applications
Focus on: modern hydrocolloids

Definition of hydrocolloids: survey of modern hydrocolloids: purposes and uses
How dispersion and hydration work
How thickeners are differentiated: aesthetic and functional properties
Application of hydrocolloids for thickening hot and cold liquids

Focus on carrageenan and suitable applications
Focus on xanthan gum and locust bean gum: properties and uses

Readings
TB pp. 4-38 > 47

5. Gels

Definition of gels - How gelling works - Familiar and traditional gels
Thermo-reversible and thermo-irreversible gels
Egg gels, Starch Gels, Dairy and tofu gels: definition and characteristics

5.1 Modern gels

Gelling with hydrocolloids - Sources of hydrocolloid agents - How to choose an appropriate gelling agent: factors that influence the choice

Cold gels

Suitable gelling agents: 160 bloom gelatin, iota and kappa carrageenan, agar agar, low-acyl gellan, high-acyl gellan, and proprietary products

Heat resistant gels - Firm and soft gels

Readings
TB pp. 4-67 > 123 - 4-124 > 160 On food and cooking - Harold McGee pp. 597-610

5.2 Fluid gels
The double personality of fluid gels: variation of viscosity depending on the amount of force applied - Focus on Agar agar and gellan gum
Fluid gels as a suitable first step for syphon thick foams

Fluid gels TB pp. 4-176 > 183

5.3 Gel films
Selection of hydrocolloids with high elasticity - Modernist ravioli, tagliatelle, and rolls
Fluid gels TB pp. 4-168 > 169

6. Foams
Definition of foam: a special type of emulsion - Dispersed and continuous phase - The complexity of foams - The importance of creating new foams through practical experiments

Foaming agents (or foam stabilizers)
Examples of foams and related stabilizers
Interaction and contrast between foam stabilizers

Survey on traditional and familiar foams, traditional stabilizers and preparation methods - Making a foam: conventional and unconventional methods

6.1 Modernist foams
Combination of classical and innovative stabilizers - Survey on innovative foam stabilizers and foam inhibitors - Suitable tools to make foams: from whisk to the aquarium bubbler
Different foam structures due to different foaming agents and foaming methods

The whipping syphon: advanced applications - Nitrous oxide and carbon dioxide: the reasons for a choice

Readings
TB pp. 4-243 > 263

6.2 Froths, airs and bubbles: definition and preparation methods - Suitable foaming tools: electric whisk, hand blender, whipping syphon
Different consistencies and stability for various culinary purposes

Light and thick foams: suitable applications and foaming methods - Tips and suggestions for stability
Different serving temperatures of gelatin foams and other hydrocolloid-based foams - Suitable stabilizers for hot foams
Focus on gellan gum, carrageenan, agar agar and proprietary products

Readings

TB pp. 4-264 > 287