AUF | The American University of Florence	SYLLABUS	

APICIUS – INTERNATIONAL SCHOOL OF HOSPITALITY

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 includes experiential learning hours with our Community Engagement Member Institutions (CEMI).

2. OBJECTIVES

The aim of the course is to introduce students to the new frontiers of cookery by a full immersion in the science of cooking that has developed during the last decades and changed culinary art dramatically like many other past revolutions did. Students will have the possibility to practice with instruments and materials that can be usually seen only in books or on television and understand the great potential of modernist cookery. The course offers the possibility to understand how flavors, textures and visual appearance of food can be impacted by using specific techniques and ingredients.

Upon the successful completion of the course students will be able to:
Understand there is chemistry behind every single food preparation either prepared following the traditional methods or the contemporary techniques
Understand that the application of modernist techniques and ingredients is not a deflection from cooking but just its natural evolution
Understand the advantages of specific temperatures on the development of textures and flavors once impossible to reach with traditional methods
Apply natural additives for the creation of food with unexpected textures, flavors and temperatures
Gain knowledge of techniques that will widen their creativity
Understand the suitable applications of the learned techniques in a restaurant menu and the advantages most of these techniques offer in terms of food cost control.

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, and projects. Mediums for instruction used will include, but are not limited to, interactive and hands-on activities which challenge thought processes, academic texts and studies, videos, slides, guided problem solving, and experiential and/or field learning activities where applicable.

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 successful completion of the course.
Where applicable, additional materials, handouts and/or notes will 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

LIBRARIES IN FLORENCE

Please consult the posted schedules for official opening times of the university library. Also note that the library is for consultation only and it is not possible to borrow materials. The library is equipped with a scanner and internet access so that you may save or email a digital copy of the pages needed.
Students may also utilize additional libraries and research centers within the local community:

BIBLIOTECA PALAGIO DI PARTE GUELFA

Located in Piazzetta di Parte Guelfa between Piazza della Repubblica and Ponte Vecchio. Please consult the library website for hours of operation:
http://www.biblioteche.comune.fi.it/biblioteca_palagio_di_parte_guelfa/

BIBLIOTECA DELLE OBLATE

Located in via dell'Oriuolo 26. Please consult the library website for hours of operation:
www.bibliotecadelleoblate.it

THE HAROLD ACTON LIBRARY AT THE BRITISH INSTITUTE OF FLORENCE

Located in Lungarno Guicciardini 9. Please consult the library website for hours of operation. This library requires a fee-based student membership. For information: www.britishinstitute.it/en

6. FIELD LEARNING

Please consult your Official Registration for any mandatory field learning dates. Field Learning Activities cited in Official Registrations are an integral part of the course and also include an assignment that counts towards your final grade, details will be provided on the first day of class.

7. COURSE MATERIALS

Professional Cooking courses:

(NOTE: STUDENTS MUST ALSO ADHERE TO KITCHEN RULES OUTLINED IN THE GANZO/FEDORA 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).

8. 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. The exact amount will be communicated by the instructor on the first day of class.

9. EVALUATION – GRADING SYSTEM

10% Attendance
30% Class Participation and Assignments
20% Midterm Exam, Field Learning project (if applicable), Special/Research Project (if applicable), Practical Performance (if applicable)
20% Final Exam
20% Paper/Project

A = 93-100 %, A- = 90-92%, B+= 87-89%, B = 83-86%, B-=80-82%, C+ = 77-79%, C=73-76%, C-=70-72%, D = 60-69%, F= 0-59%, W = Official Withdrawal, W/F = Failure to withdraw by the designated date.

10. ATTENDANCE – PARTICIPATION

Academic integrity and mutual respect between instructor and student are central to the academic policy and reflected in the attendance regulations. Student presence is mandatory and counts toward the final grade.

Absences are based on academic hours: 1 absence equals 3 lecture hours.
Two absences: 6 lecture hours, attendance and participation grade will be impacted.
Three absences: 9 lecture hours, the final grade may be lowered by one letter grade.
Four absences: 12 lecture hours, constitutes automatic failure of the course regardless of when absences are incurred.
Please note:
- The above hours refer to lecture hours. Please note that the contact / credit hour policy in the academic catalog includes additional distribution ratios according to delivery category. Ex: 1 absence equals 6 FL/SL/Lab hours or 9 EL hours.
- Hours may be distributed in different formats according to the academic course schedules.

LATE ARRIVAL AND EARLY DEPARTURE

Arriving late or departing early from class is not acceptable. Two late arrivals or early departures or a combination will result in an unexcused absence. Travel is not an exceptional circumstance.

TRAVEL (OR DELAYS DUE TO TRAVEL) IS NEVER AN EXCUSE FOR ABSENCE FROM CLASS.

It is the student's responsibility to know how many absences are incurred. If in doubt, speak with your instructor!

Participation: Satisfactory participation will be the result of contributing to class discussions by putting forth insightful and constructive questions, comments and observations. Overall effort, cooperation during group work, proper care of work space and tools, responsible behavior, and completion of assignments will be assessed. All of the above criteria also apply to Field Learning and site visits.

11. EXAMS – PAPERS – PROJECTS

Assignments
Students are asked to manage the kitchen with a responsible behavior and abide by the HACCP guidelines. Students are asked to collaborate to the purchasing, storing and issuing of the ingredients necessary to provide the service related to the course activities.
Class participation and assignments account for the 30% of the final course grade.

The **Final Paper/Project** accounts for 20% of the course grade.
Format: topic, length, guidelines, and due date will be provided in the course addendum.
Material for research will be available at the university library.

The **Final Exam** consists of a written and a hands-on test, and accounts for 20% of the final course grade. For exam time and date consult the course addendum. **The time and date of the exam cannot be changed for any reason.**
Format: the written exam 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.

For the hands-on exam students will follow the instructor guidelines. Please consult the course addendum.

The Final Exam is cumulative.

12. LESSONS

Topics & Learning Outcomes

Phase 1

Introduction to the course

The development of cuisine in the history of mankind - Evolution of cooking and cooking revolutions during centuries - 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 - Modernist cuisine in France, Spain, England and United States: differences and common grounds The "modernist" kitchen - How the contemporary revolution changed the kitchen layout The modernist cuisine equipment: kitchen, lab or both? - Thickeners, hydrocolloids, gels, gums, enzymes, centrifuge, cryogenic freezing: 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

Cryogenic freezing - Advanced culinary applications of liquid nitrogen

Definition of liquid nitrogen and chemical features - Applications of liquid nitrogen for cooking - The effects of temperature difference on food texture: cryosearing - Cryogenic freezing for shattering, powdering, poaching - Decorating food with the help of liquid nitrogen: shaping fat or viscous materials, disassembling fruits - Safe handling of cryogens

Readings
TB pp. 2-456 / 2-463

Cryogenic freezing and 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 - Safe handling of cryogens

Readings
TB pp. 2-464 > 473

Sous-vide cooking applications - Immersion circulator and the cook&hold cooking method
Overview on sous vide packaging 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
Advanced sous vide cooking techniques: Focus on Cook and hold to final temperature for slow changes in meat structure - Water bath strategies for cooking sous vide: bath set to final temperature / set hotter than final temperature / combination of the two methods

Readings
TB pp.4-192 > 279

<u>Phase 2</u>

Thickening: from reduction by concentration to modern hydrocolloids - Part 1
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
Modern thickeners and suitable applications
Focus on: modified starches
Pre-hydrated starches for instant "pour and stir" application
Advantages of modified starches application: lump-free thickening effects, high solubility in hot and cold liquids, excellent flavor release
Tapioca maltodextrin and modified tapioca starch applications
Stabilizing high-fat liquids into powders
Transforming fruit purees with high water content into dehydrated crunchies

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

Thickening: from reduction by concentration to modern hydrocolloids - Part 2
Focus on: modern hydrocolloids
Definition of hydrocolloids: from common flour and gelatin to xanthan gum, and carrageenan - Survey on 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 lambda carrageenan: strong interaction with proteins and stability for dairy based solutions
Focus on xanthan gum and locust bean gum: properties and uses

Readings
TB pp. 4-38 > 47

Gels - Part 1
Definition of gels - How gelling works
Thermo-reversible and thermo-irreversible gels
Familiar and traditional gels
Egg gels, Starch Gels, Dairy and tofu gels: definition and characteristics
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 - Select gelling agents depending on desired consistency and starting liquid - Firm & Coating gels: the new frontier of chaud-froid
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

Readings
TB pp. 4-67 > 123 - 4-124 > 160 Fluid gels TB pp. 4-176 > 183
On food and cooking - Harold McGee pp. 597-610

Gels - Part 2
Hot gels
Agar agar, carrageenan, LM pectin and gellan: gelling agents with a warm melting point: a sensory revolution
Expanding textures and melting points by combining gelling agents and gums
Hot fruit and vegetables gel - Interference of natural acidity and calcium content on gel formation - Step by step method for a hot fruit gel
Gel films - application to both cold or hot gels - Suitable equipment

Readings
TB pp. 4-160 > 169 - TB pp. 4-170 > 175

Phase 3

Foams - Part 1
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
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

Foams - Part 2
Different consistencies and stability for various culinary purposes

Froths, airs and bubbles: definition and preparation methods - Suitable foaming tools
Light foams: suitable applications and foaming methods - Tips and suggestions for stability
Thick foams: fine textured foams with abundant continuous phase - Different serving temperatures of gelatin foams and other hydrocolloid-based foams - suitable stabilizers for hot foams

Readings
TB pp. 4-264 > 287

Foams - Part 3
Set foams: when continuous phase solidfies - Different textures of set foams - Suitable foaming methods and foam stabilizers - Hot and cold set foams
HPMC application to hot and cold set foams
Puffed snacks: starch gel dehydrated bases - The importance of moisture content

Readings
TB pp. 4-288 > 315

Learning Outcomes

- Understand the development of cuisine through the great revolutions that occurred during centuries
- Understand the importance of considering the modernist revolution as the latest step in culinary evolution and not just a deflection from cooking
- Learn the importance of precision instruments and technical equipment
- Learn the possible applications of cryofreezing for a variety of purposes
- Understand the potential danger when handling liquid nitrogen and learn the safety rules
- Understand the potential applications of carbonation: for preservation and for flavor
- Learn how to infuse flavors with carbonation and the added value of fizziness
- Understand the importance of precision cooking to develop slow changes during meat cooking
- Learn and apply cook and hold cooking technique
- Learn which are the factors that influence thickening
- Understand the limits of classic starches for flavor release
- Learn the variety of modified starches now available, their purposes and applications
- Identify hydrocolloids
- Understand the properties of thickeners
- Learn to use dedicated thickeners for specific effects and liquids composition
- Learn the sources of hydrocolloids as developed by chemical industries for food applications
- Learn to use modern hydrocolloids for gelling
- Learn the definition and structure of gels, made with the traditional to the contemporary materials
- Get confident with gelling agents for firm and coating gels
- Understand the advantages of cold coating gels compared to classic chaud-froid
- Learn the suitable applications of fluid gels
- Learn how to use gelling agents and thickeners that resist warm temperatures
- Understand the definition of foams and its structure
- Understand similarities and differences between emulsions and foams
- Learn the function of stabilizers and thickeners in foams formation
- Be able to compare familiar with contemporary foams
- Understand the purpose of foaming to achieve new textures and an overall lightness
- Learn all possible instruments to produce foams according to the chosen mixture and desired result
- Learn advanced applications of the whipping syphon

- Understand the suitable application of gases for syphon use
- Learn the distinction between froths, air and foams: how the bubbles size and geometry influence flavor perception
- Understand the use of airs and froths as airy and light sauces
- Learn the suitable stabilizers and gelling agents for set foams production
- Learn how to produce puffed snacks with familiar starches and contemporary additives