

NEW COURSE PROPOSAL**Courses must be submitted by November 9, 2007, to make the next catalog production**DATE (*Change if modified*)

10/30/2007 REV 12.18.07

PROGRAM AREA(S)

CHEMISTRY

1. Catalog Description of the Course. *[Follow accepted catalog format.]***Prefix(es)** (Add additional prefixes if cross-listed) **CHEM** **Course No.** **335****Title:** **THE CHEMISTRY OF THE KITCHEN** **Units:** **3**☐ Prerequisites☐ Corequisites☐ Consent of Instructor Required for Enrollment**Description** (Do not use any symbols): **An overview of the molecules in foods and the chemical reactions that occur during the preparation of foods. Ingredients and methods from a diverse set of cultural traditions will be considered.****Grading Scheme:**☒ A-F Grades☐ Credit/No Credit☐ Optional (Student Choice)**Repeatability:**☐ Repeatable for a maximum of
units

Total Completions Allowed

☐ Multiple Enrollment in Same Semester**Lab Fee Required:** ☒**Mode of Instruction/Components** (*Hours per Unit are defaulted.*)

	Units	Hours per Unit	Benchmark Enrollment	Graded Component	CS & HEGIS # (Filled in by the Dean)
Lecture	2	1	24	☒	
Seminar		1		☐	
Laboratory		1		☐	
Activity	1	2	24	☒	
Field Studies				☐	
Indep Study				☐	
Other Blank				☐	

The following two lines will be filled out internally based on the Mode of Instruction data directly above.

2 hours lecture per week (*Use 2nd line only if necessary*)

2 hours activity per week

Course Attributes:☒ **General Education Categories:** All courses with GE categories notations (including deletions) must be processed at the GE website: <http://summit.csuci.edu/geapproval>. Upon completion, the GE Committee will forward your documents to the Curriculum Committee for further processing.**A (English Language, Communication, Critical Thinking)**A-1 Oral Communication ☐A-2 English Writing ☐A-3 Critical Thinking ☐**B (Mathematics, Sciences & Technology)**B-1 Physical Sciences ☒B-2 Life Sciences – Biology ☐B-3 Mathematics – Mathematics and Applications ☐B-4 Computers and Information Technology ☐**C (Fine Arts, Literature, Languages & Cultures)**C-1 Art ☐C-2 Literature Courses ☐C-3a Language ☐C-3b Multicultural ☐**D (Social Perspectives)** ☐

E (Human Psychological and Physiological Perspectives) ☐

UDIGE/INTD Interdisciplinary ☒

Meets University Writing Requirement ☐

Meets University Language Requirement ☐

☐ American Institutions, Title V Section 40404: ☐ Government ☐ US Constitution ☐ US History
Refer to website, Exec Order 405, for more information: <http://senate.csuci.edu/comm/curriculum/resources.htm>

☐ Service Learning Course

3. Justification and Requirements for the Course. (Make a brief statement to justify the need for the course)

A. Justification: CHEM 335 is an elective and is not required for any chemistry major. CHEM 335 presents an overview of the molecules in foods and the chemical reactions that occur during the preparation of foods. Ingredients and methods from a diverse set of cultural traditions will be considered, and as all foods are composed of biological molecules with uniquely biological characteristics, CHEM335 is fundamentally interdisciplinary as well. The lab activity will give CHEM 305 students a working knowledge of how these ideas may be implemented in the kitchen.

B. Degree Requirement: ☐ Requirement for the Major/Minor
☐ Elective for the Major/Minor

Note: Submit Program Modification if this course changes your program.

4. Learning Objectives. (Bullets, will occur upon carriage return)

Upon completion of the course, the student will be able to:

- communicate in oral and written form
- discuss the history of familiar food traditions (Asian, Latin, Indian, European, etc.)
- identify the molecules of foods and food additives (proteins, fats, carbohydrates, salts, etc.)
- describe the chemical and physical characteristics of these molecules
- demonstrate how the combinations and reactions of these molecules result in food textures and flavors

5. Course Content in Outline Form. [Be as brief as possible, but use as much space as necessary]

- I. Structure and properties of biological molecules
- II. Survey of food traditions
- III. Survey of cooking methods and utensils
- IV. Dairy products
- V. Eggs
- VI. Meats
- VII. Vegetables, fruits, legums grains and nuts
- VIII. Herbs, spices, flavorings and beverages
- IX. Doughs and batters
- X. Sauces
- XI. Desserts
- XII. Beer, wine and spirits

The course structure presented above reflects an approach in which individual foods are used as a vehicle for illustrating the chemical and physical properties of biological molecules. The course will cover several fundamental concepts in chemistry:

- 1. the relationship between chemical structure and physical properties
- 2. how the chemical properties of molecules affect intermolecular interactions
- 3. how chemical structure determines chemical reactivity
- 4. how thermodynamics and kinetics control chemical reactions

Does this course overlap a course offered in your academic program? YES ☐ NO ☒

If YES, what course(s) and provide a justification of the overlap?

Does this course overlap a course offered in another academic area? YES ☐ NO ☒

If YES, what course(s) and provide a justification of the overlap?

Signature of Academic Chair(s) of the other academic area(s) is required on the signature sheet below.

6. Cross-listed Courses *(Please fill out separate description in item 1 above, for each PREFIX)*

A. List Cross-listed Courses (Signature of Academic Chair(s) of the other academic area(s) is required).
Prefix for cross-listed discipline(s):

B. Department responsible for staffing:

7. References. *[Provide 3 - 5 references on which this course is based and/or support it.]*

- 1. Harold McGee, On Food and Cooking: the Science and Lore of the Kitchen, Scribner 2004
- 2. Peter Barham, The Science of Cooking, Springer 2001
- 3. Simeen Sartar, Chemistry of Cooking, Course Syllabus, Georgetown Univ. Chem. Department, 2006
- 4. Sophie & Michael Coe, The True History of Chocolate, Thames & Hudson, 1996
- 5. Susie Ward, et al., The Gourmet Atlas: The History, Origin and Migration of Foods of the World, Wiley 1997

8. List Faculty Qualified to Teach This Course.

- Blake Gillespie

9. Effective Date

A. First semester offered: Spring 2009

10. New Resources Required. YES ☐ NO ☒

If YES, list the resources needed and obtain signatures from the appropriate programs/units on the sheet below.

A. Computer (data processing), audio visual, broadcasting needs, other equipment)

B. Library needs

C. Facility/space needs

11. Will this new course alter any degree, credential, certificate, or minor in your program? YES ☐ NO ☒

If, YES attach a program modification form for all programs affected.

Catalog deadline for New Minors and Programs (including modifications): October 15, 2007, preceding year.

Catalog deadline for Course Proposals and Modifications: November 9, 2007, of preceding year.

Last day to submit any work to be considered for the academic year: April 15th.

Blake Gillespie

Proposer of Course

10/30/2007

Date

**Request for CHEM 335: The Chemistry of the Kitchen to be added to GE Category B1: Physical Sciences
-- Chemistry, Physics, Geology, and Earth Sciences.**

Committee Response:

Approved by committee on 12-13-2007

Criteria and Justifications Submitted:

- *Promote the understanding and appreciation of the methodologies of math or science as investigative tools and the limitations of mathematical or scientific endeavors*

CHEM 335 links basic chemical concepts and knowledge of biological molecule structure and function to their practical application in food preparation. Almost every aspect of cooking can be used to illustrate a basic principle of the physical world: the behaviors of solutions, the thermodynamics and kinetics of chemical processes, and the physical manifestation of food molecules' chemical properties will all be explored.

- *Present mathematical or scientific knowledge in a historical perspective and the influences of math or science on the development of world civilizations, both past and present*

CHEM 335 presents the history of various food traditions and uses this history to highlight basic chemical concepts. A perfect example is the use of chocolate to outline the behavior of solutions and emulsions. Chocolate was originally used as a foodstuff among Pre-columbian meso-American societies, but its use was later adapted to European tastes and technologies. The Maya made an emulsion-based beverage out of the fat-rich cacao. Europeans eventually made what we now know of as chocolate by extracting the cocoa butter from the cured seeds, leaving behind the much easier-to-cook-with cocoa powder.

- *Apply inductive and deductive reasoning processes and explore fallacies and misconceptions in the mathematical or scientific areas*

A complementary lecture and laboratory pairing is the perfect place to use reasoning skills and experimentation to explore students' preconceived notions about how food is prepared. The creation and stabilization of egg (but not milk) foams by cream of tartar serves as a platform for examining acid/base chemistry. Beginning with their knowledge of biological molecules' electrostatic characteristics, students should be able to deduce a rationale for why egg foam is supported with this additive and creams are not. Likewise, as the students' facility with chemical properties improves, they will develop their ability to extrapolate to ingredients' behavior during cooking.

- *Present the principles and concepts of the physical sciences and the physical universe*

Food preparation depends at every level on the chemical and physical characteristics of sugar, lipid and protein molecules, as well as how these change upon mixing and/or cooking. Using milk as an example again, its chemical properties drive it to form an emulsion. As well, the various 'classes' of milk we use today (nonfat, 1%, 2%, 5%, half-and-half, etc) all have very distinct physical properties that give them different culinary applications; likewise the separation of milk into heavy and light layers is just one example of how CHEM 335 will explore reaction kinetics.

Request for CHEM 335: The Chemistry of the Kitchen to be added to GE Category UDIGE: Upper Division Interdisciplinary GE.

Committee Response:

Approved by committee on 12-13-2007

Criteria and Justifications Submitted:

- *Emphasize interdisciplinarity by integrating content, ideas, and approaches from two or more disciplines*
The course closely links the chemical characteristics of biological molecules to their physical properties. Food is a highly accessible vehicle for connecting subjects that most students normally segregate. Specifically, food traditions and preparation methods will be the content, but the ideas will be those of the scientific description of the natural world. The unfamiliar scientific method will be coupled to the very familiar subjects of food and cooking, showcasing how the tools of science may be applied in various disciplines (chemistry, biology, physics) as well as to a seemingly unrelated practice (cooking). Additionally, during course development, faculty from across disciplines were consulted to ensure that the course would integrate approaches from various areas of the physical and natural sciences, as well as the humanities. These were Amy Denton (Biology), Greg Wood (Physics) and Brad Monsma (English, and CIS director).
- *Include substantive written work consisting of in-class writing as well as outside class writing of revised prose. Examples of appropriate written work include: short papers, long papers, term papers, lab reports, documentation, disciplinary-based letters and memos, and essays.*
CHEM 305 utilizes writing assignments extensively. First, students will write two research papers: one using the ingredients and methods of one food tradition to illustrate chemical concepts, the other concentrating on how chemistry controls of the preparation of a recipe of the student's choice. Likewise, the lab will require preparation of at least two reports summarizing the class' use of the scientific method in dissecting several recipes.

Approval Sheet

Program/Course: Chem 335

Program Chair(s)	Date
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Program Chair(s)	Date
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General Education Chair(s)	Date
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Curriculum Committee Chair(s)	Date
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Dean of Faculty	Date
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