FDSC 6033 SYLLABUS - 2016
Applied Food Biochemistry
TuTh 8:00-9:15, FDSC D-2

General Description
FDSC 6033 Food Biochemistry (SP, Even years). Biochemical characteristics, functions, regulation and impact of components in raw and processed foods of plant origin with focus on applications affecting food quality. Lecture/discussion 3 hours per week. Prerequisite: CHEM 3813. Instructors: Howard, Buescher and Proctor, Department of Food Science.

Schedule
Jan. 20 General Characteristics and Unique Features of Perishable Crops
Introduction to FDSC 6033
Quizzes, exams, written assignments (patent report; industry proposal)
General structure and composition of perishable food crops

Week 1-3 Importance and Regulation of Postharvest Metabolism (Dr. Howard)
Influence of respiration on sugars and acids
Respiration affected by temperature
Role of ethylene
Influence of modified/controlled atmospheres/packaging
Effect of minimal processing
Effect of stresses- physical, biological, physiological
Stress metabolites- examples
Chilling injury

Quiz (Feb.4)

Week 4 Lipid Oxidation by Triplet and Singlet Oxygen (Dr. Proctor)
Active oxygen species and free radical theory
Formation of active oxygen-oxidases, irradiation, chemical oxidants
Lipid oxidation- hydroperoxide formation and decomposition
Photo-oxidation of unsaturated lipids

Influence of Phenolic Substances and Related Enzymes on Quality (Dr. Howard)
Phenylpropanoid (Shikimic acid) pathway
Influence of phenolic substances on food appearance and taste
Factors affecting phenolic composition of food
Importance of polyphenol oxidases
Regulation of chemical and enzymatic browning reactions

Week 5 Phenolics and Health Promotion (Dr. Howard)
Free radicals in biological systems
Oxidative stress and chronic diseases
Antioxidant defense systems
Antioxidants in fruits and vegetables
Absorption and metabolism of polyphenolics
Efficacy of polyphenolics in promoting human health
Features and Effects of Certain Oxidation-Reduction Reactions (Dr. Howard)
Oxidants- oxidases, halogens, ozone, transition metals
Reductants- reductases, sulphhydryl substances, others

Week 6-7  Exam (Feb. 23)

Biochemistry of Texture (Dr. Buescher)
- Structural components responsible for texture
- Cell wall-middle lamella ultra-structure
- Depolymerization and de-methoxylation of pectic substances
- Types and modifications of cross-linkages
- Regulation of texture in fresh and processed products

Week 8  Quiz (Mar. 15)

Natural Colorants- Sources and Stabilities (Dr. Howard)
- Certified and noncertified colors
- Anthocyanins
- Chlorophylls
- Carotenoids and xanthophylls
- Curcuminoids
- Bixin, carminic acid, crocin

Patent report and title of industry research proposal due March 15

Week 10  Spring Break (Mar. 21-25)

Week 11-12  Oral presentations and class discussions of patent reviews (Mar. 29)

Biogenesis and Characteristics of Flavors of Plant Origin (Dr. Howard)
- Types of flavor volatiles
- Formation of pyrazines
- Sulfur-containing volatiles
- Volatiles derived from fatty acids
- Phenylpropanoid pathway derived flavors
- Volatile terpenoid biogenesis
- Pungent substances- capsaicins, allicin, phenylpropanoids

Week 13-14  Exam (Apr. 12)

Grape and Wine Chemistry (Dr. Howard)
- Brief history and types
- Postharvest handling and extraction of juice
- Fermentation and aging reactions affecting quality
- Functions and chemistry of sulfur dioxide treatment of wine
- Quality preservation

Glycoalkaloids and Cyanogenic Glycosides (Dr. Howard)
- Types, sources, functions, toxicity
- Postharvest factors affecting synthesis and degradation
- Processing methods of food crops containing toxins

Written industry proposals due Apr. 19


**Week 15-16**  
*Quiz (Apr. 26)*

*Reports and class discussions on industry research proposals*  
*Review and Wrap-up (Last class May 5)*

**FINAL EXAM**  
Tuesday May 10th, 8:00am-10:00am

**Primary Reference Sources**

Primary sources of reference materials will be from Journal of Food Science, Food Biochemistry, Journal of Agricultural and Food Chemistry as well as books (Food Chemistry) and websites. Lecture materials, visuals and reference materials will be handouts and/or available on Blackboard.

**Grades**

Grades will be determined from the total points scored on exams, quizzes and reports with 100-90%, A; 89-80%, B; 79-70%, C; 69-60%, D.

The following is an estimate of points and number of exams, quizzes and reports

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<tr>
<th>Items</th>
<th>No.</th>
<th>Points</th>
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<td>Exams @ 100</td>
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<tr>
<td>Quizzes @ 50</td>
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<tr>
<td>Reports- Patent review . Proposal @ 50</td>
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<tr>
<td><strong>Total</strong></td>
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Quizzes and exams missed due to unexcused absences cannot be made up. Quizzes and exams missed due to excused absences (official university functions, medical situations or deaths in the family) must be made up within one week after the absence.

**Announcements:**

Announcements will be conveyed by E-mail.

**Students with Disability:**

Students needing special accommodations should inform the instructor during the first week to determine arrangements.

**Inclement Weather:**

Students will be notified by E-mail of any class cancellations due to inclement weather. The University guidelines for classes affected by adverse weather conditions will be followed.

“As a core part of its mission, the University of Arkansas provides students with the opportunity to further their educational goals through programs of study and research in an environment that promotes freedom of inquiry and academic responsibility. Accomplishing this mission is only possible when intellectual honesty and individual integrity prevail.”

“Each University of Arkansas student is required to be familiar with and abide by the University’s ‘Academic Integrity Policy’ which may be found at http://provost.uark.edu/245.php”.

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