

**FDSC 6033 SYLLABUS- 2017**  
**Applied Food Biochemistry**  
**TuTh 9:30-10:45 am, FDSC D-2**

**General Description**

**FDSC 6033 Food Biochemistry** (Fall, Odd 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, Proctor and Threlfall, Department of Food Science.

**Schedule**

***Week 1***

***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 2-3***

***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

***Week 4-5***

***Quiz (Sept. 12)***

***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

***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, sulfhydryl substances, others

***Week 6***

***Natural Colorants- Sources and Stabilities (Dr. Howard)***

Certified and noncertified colors

Anthocyanins

Chlorophylls

Carotenoids and xanthophylls

Curcuminoids

Bixin, carminic acid, crocin

**Week 7-8**

**Exam (Oct. 3)**

***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

***Patent report and title of industry research proposal due Oct. 12***

**Week 9**

**Quiz (Oct 19)**

***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

**Week 10-11**

***Oral presentations and class discussions of patent reviews (Oct. 24)***

***Odor Active Substances (Dr. Leitner)***

***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 12-13**

**Exam (Nov. 7)**

***Grape and Wine Chemistry (Dr. Threlfall)***

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 Nov. 14***

**Week 14-15**

**Quiz (Nov. 21)**

***Reports and class discussions on industry research proposals  
Review and Wrap-up (Last class Dec. 7)***

**FINAL EXAM**

***Thursday December 14th<sup>h</sup>, 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

<b>Items</b>	<b>No.</b>	<b>Points</b>
Exams @ 100	3	300
Quizzes @ 50	3	150
Reports- Patent review , Proposal @ 50	2	<u>100</u>
Total		550

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>”.*