Description of Course: Does cinnamon influence blood sugar? Does black pepper affect fat cell production? Do artificial food dyes cause hyperactive behavior? Can broccoli help prevent cancer? These examples represent compounds that are frequently consumed, yet rarely discussed. Bioactive food compounds (BAFC) are components in food that have biological activity in the body, yet have no disease associated with their absence. Food additives are usually meant to affect a food quality, but by proxy can also have biological effects on the body. These topics are covered in detail so that students are not limited to the basic 6 nutrients.

Locations and Times: This course is offered completely online. Although there will be enforced deadlines, students are not required to be online at certain times or days.

Instructor Information
Name: Jennifer Ravia, MS
Office Location: Shantz 324
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Office Hours: 2-3pm Tuesday and 930-1130am Wednesday

Pre-requisite: NSC 170C1 or NSC 101

Course Objectives and Expected Learning Outcomes: Upon completing the course, students will be able to:

- List and describe the major categories of BAFC
- Identify bioactive compounds from common foods, food groups and spices that have positive biological activity in the body.
- Explain how some foods in the diet can be combined to produce synergistic biological effects through their bioactive compounds
- Explain how bioactive compounds affect cancer development, blood glucose control, inflammatory pathways, oxidative pathways and fat cell development
- State the categories of additives, explain their purpose and discuss how additive use has shifted over the past century, including economic implications
- Compare and contrast the biological health effects of natural vs. artificial additives
- Outline differences between intentional and non-intentional food additives, and explain possible health implications resulting from effect of additives on biological systems

Course Methodology: Students will read material from assigned texts, provided handouts and select internet links, view short videos and take self quizzes to prepare for the graded work, which includes exams, online discussions with classmates, and assignments.

Teaching Format: The course will be delivered online in an asynchronous environment, meaning that at no time are students and instructors required to be online at the same time. Students will utilize text books, outside readings and online resources to complete online discussions, assignments and quizzes. The instructor will provide power point slides with select voice overs to act as lecture supplements to the reading material.

Required Readings: An Evidence-based Approach to Phytochemicals and Other Dietary Factors by Jane Higdon and Victoria Drake, 2012; Available in the UA Bookstore or online at amazon.com
Examples of other reading available through the UA library and/or D2L:

- Benzie IFF and Wachtel-Galor S. Herbal Medicine, 2nd edition. CRC Press; 2011
- Park UH, Jeong HS, Jo EY, Park T, Yoon SK, Kim EJ, Jeong JC, Um SJ. Piperine, a component of black pepper, inhibits adipogenesis by antagonizing PPARγ activity in 3T3-L1 cells. J Agric Food Chem. 2012

Grading Policy: This course is divided into 4 modules. Each module will include an exam (50pts each), a discussion (35pts each) and an assignment (40pts each) for a total of 125pts per module, or 500pts for the entire class. Final grades are based on the following percentages out of 500pts:

- 450-500 = 90% and above = A
- 400-449 = 80-89.9% = B
- 350-399 = 70-79.9% = C
- 300-349 = 60-69% = D
- <240 = <60% = E

- All assigned work will be available for a fixed period of time. It will be the student's responsibility to plan accordingly. Late assignments will not be accepted.
- Incompletes will be considered on a case by case basis only if a student has completed at least 80% of the course before an unforeseen event occurs.
- Students are responsible for their own work, and for ensuring that all of their work is theirs alone. See the academic integrity item below for further information.

Attendance Policy: Student participation in this online class is flexible. There will be due dates, but students...
may work at their own pace within those due dates.

**Graded Work:** This course will utilize the D2L platform for online learning. Students will use the quiz, discussion, and dropbox tools to submit their graded work.

**Written assignments** will include essays and short answer assignments. Topics may include these examples:
- Choose a disease state and summarize the bioactive research
- Compare and contrast current sodium related research-summarize both sides of the recommendation argument
- Soy debate: do the BAFC in soy help or hinder hormonal processes in the body.

**Online discussions** will require written, unique responses to the following topics:
- Epidemiological arguments for consuming a particular BAFC for example, curcumin from turmeric in India and low rates of Alzheimer’s
- Additive discussion-compare and contrast a natural vs. artificial additives that are used for the same purpose, and discuss possible health implications
- Highlight a BAFC not covered in class, including biological pathway affected

**Exams** will be timed and delivered at regular intervals. Exams will cover material from the lectures and readings. Students will be provided with learning objectives to help guide them in their studying.

**Course Behavior:** Professional respect and rapport is expected both when interacting with other students and while interacting with the instructor. The Arizona Board of Regents’ Student Code of Conduct, ABOR Policy 5-308, prohibits threats of physical harm to any member of the University community, including to one’s self. See: [http://policy.web.arizona.edu/~policy/threaten.shtml](http://policy.web.arizona.edu/~policy/threaten.shtml).

**Special Needs and Accommodations Statement:** Students who need special accommodation or services should contact the Disability Resources Center, 1224 East Lowell Street, Tucson, AZ 85721, (520) 621-3268, FAX (520) 621-9423, email: uadrc@email.arizona.edu, [http://drc.arizona.edu/](http://drc.arizona.edu/). You must register and request that the Center or DRC send me official notification of your accommodations needs as soon as possible. Please plan to meet with me by appointment or during office hours to discuss accommodations and how my course requirements and activities may impact your ability to fully participate. The need for accommodations must be documented by the appropriate office.

**Student Code of Academic Integrity:** Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See: [http://dos.web.arizona.edu/uapolicies/](http://dos.web.arizona.edu/uapolicies/).

**Confidentiality of Student Records:** [http://www.registrar.arizona.edu/ferpa/default.htm](http://www.registrar.arizona.edu/ferpa/default.htm)

**Subject to Change Statement:** Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.
<table>
<thead>
<tr>
<th>Modules</th>
<th>Topic</th>
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| Module 1 | Topic 1 | Review of basic nutrition, intro to BAFC and classification as a non-nutrient, major categories and sources | Liu Paper  
  -Higdon Chapters 1-5 |
|         | Topic 2 | BAFC not always beneficial: choline and supplements | Higdon Chapter 21  
  -Benzie Chapter 17 |
|         | Topic 3 | Bioactive Food Compounds in coffee and tea | Higdon Chapters 6-7 |
|         | Topic 4 | Bioactive Food Compounds in chocolate | Hannum paper  
  -Arranz paper |
| Module 2 | Topic 5 | Red, orange and yellow: carotenoids | Higdon Chapter 8 |
|         | Topic 6 | Grapes and berries: anthocyanins, resveratrol, chlorophyll, flavonoids | Higdon Chapters 9, 11, 19 |
|         | Topic 7 | Fiber and soy: phytoestrogens, isoflavones and lignans | Higdon Chapters 12, 15, 16, 18 |
|         | Topic 8 | Garlic and Cruciferi: organosulfur compounds, isothiocyanates, indole-3-carbinol | Higdon Chapters 13, 14, 17  
  -Archarya paper (cardamom) |
| Module 3 | Topic 9 | Curcumin: turmeric in Alzheimer’s and inflammatory pathways | Benzie Ch. 13 |
|         | Topic 10 | Peperine: effect on fat cell production and synergistic effects with turmeric | Park paper (peperine)  
  -Banji paper: synergism  
  -Jacobs paper |
|         | Topic 11 | Fenugreek and cinnamon: type II diabetes and blood glucose control | Benzie, Ch. 19 |
|         | Topic 12 | Flowers and Chilis: capsaicin and crocetin | Rajput review (capsaicin)  
  -Gutheil paper (saffron) |
| Module 4 | Topic 13 | -Additive regulation and approval for use: GRAS system  
  -Preservation additives and biological activity: Nitrites, sulfites, sodium chloride etc. | Rozin paper  
  -Cook, He, Heerspink papers on sodium |
|         | Topic 14 | Color additives: risks, benefits and biological effects of natural vs. artificial | CSPI report on food additives |
|         | Topic 15 | Flavor additives-salt, natural flavors and artificial flavors-risk, benefits and biological effects | WHO report on additives |
|         | Topic 16 | Texture additives and biological activity: emulsifiers, stabilizers, thickeners; Agar agar, sea plants | Jarvis paper |