LIPID CHEMISTRY 400:505
Spring, 2013

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Food Science 315

Schedule of Topics

			Problem #
Jan.	22	**Course Introduction, perspectives, problem solving, critical thinking** Properties and functions of lipids General characterization, classifications, structures Lipid structures in biological materials	
	24	**Chemical and physical properties of fatty acids**	
	29	Fatty acid problem	**1**
	31	**Chemical and physical properties of triacylglycerols**	
Feb.	5	Triacylglycerol problem	
	7	**Chemical and physical properties of phospholipids**	**2**
	12	Phospholipid problem	**3**
	14	**Processing of fats and oils for food use**	
	19	Processing problem	**4**
	21	**Characterization and analysis of lipids: Extractions and Chemical analyses**	
	26	Analysis problem 1	**5**
	28	**Characterization and analysis of lipids: Instrumental analyses**	
Mar.	5	Analysis problem 2	**6**
	7	**Degradation reactions of lipids -- Heat, Radiation**	
	12	**Degradation reactions of lipids -- Photolysis, Enzymes**	
	14	**Degradation reactions of lipids -- Oxidation reactions**	
		(SPRING BREAK)	
	26	Degradation problem 1	**7**
	28	**Pro- oxidants**	
April	2	Degradation problem 2	**8**
	4	**Antioxidants**	
	9	Antioxidant problem	**9**
	11	**Emulsions**	
	16	Emulsions problem	
	18	**Health issues of lipids**	
	23	Health issues problem	**11**
	25	**Hot topics in lipid chemistry**	
Final exam out			
May	10	**Final exam due 4:30 PM**	

COURSE INFORMATION

Objectives of course:

1) To provide a comprehensive information base of fundamental chemistry and physics of lipids necessary for basic research, product development, and product trouble-shooting. Strong performance in this course should qualify students for industrial positions in lipid chemistry, regardless of their thesis research topics.

2) To develop high level skill and sophistication in critical thinking, integration and extrapolation, and problem solving.

3) To introduce scientific and scholarly literature resources of lipid chemistry.

Requirements of course:

Format of course:
Thursdays -- new material will be covered in lecture, application problem will be assigned.
Tuesdays – problem-solving sessions, discussions of problem-solving strategies using material from previous lectures. These are noted in the schedule. The main focus will be the lecture immediately before, but applications will build and become more complex as the semester progresses. Thus, cumulative knowledge will be needed for most problem sets.

Study guides with questions covering what should be considered "working knowledge" in lipid chemistry will be issued with each lecture. These questions are not to be handed in, but should be reviewed seriously by the students.

The final exam will be a take-home comprehensive exam based on the questions in the study guides. Hence, if the study questions are answered as the semester progresses, the final will be easy to complete.

Grade basis:	Problem assignments	80%
	Final exam	20%

Pointers for solving problems:

1. Think first, apply what you know, look up additional information later. Students have a tendency to look for the correct answers, but in real life situations there are no exclusively CORRECT answers -- only workable ones.
2. Think molecules rather than systems, and think quantitatively rather than descriptively. E.g. rather than just saying the mp would decrease, think how much the mp would decrease and what fatty acids or modifications would give that decrease.
3. Question everything. Take nothing for granted.
4. Make a plan. Start by identifying the important issues or factors, and then use this to focus your strategies for solving the problem.
5. Explain your reasoning for each step of the solution. This helps validate what you propose.

PROBLEM-SOLVING STRATEGIES

1. Decide/determine what the question REALLY is.

2. What fundamental information is needed to answer or solve the question?
   What chemical or physical properties are involved?
   What reactions are involved?
   What system properties are involved?
   What other issues may affect the outcome?

3. What information do you already have that may be relevant to the problem?
   What is your system?
   What are its properties?
   What is the environment?
   What resources are available to work on the problem?

4. What does this information tell you about the actual or potential behavior in the system under question?
   How do your system properties control its behavior?
   What can you expect to happen if you change components or conditions?

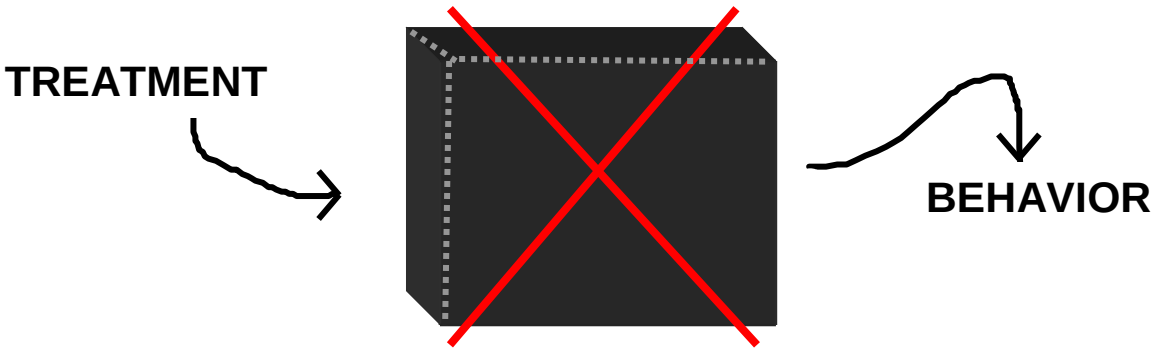
5. What additional information that you do not have will you need to solve the problem? Where can you get that information --
   Books and publications
   Experts in the field
   Suppliers
   Research

6. How can you fit everything together creatively to solve the problem?
   Don't overlook the obvious and conventional approaches, but also always try to *THINK OUTSIDE OF THE BOX!*

TOOL 1. SCHAICH'S LAW

Think molecules rather than macroscopic behaviors.

FOODS ARE NOT BLACK BOXES --



They behave according to fundamental laws of CHEMISTRY and PHYSICS!

If you want to understand and control food properties and characteristics,

you must first identify the underlying chemistry responsible for each property of interest.

Then you can use and manipulate that chemistry to your advantage.

TOOL 2. ACTIVE LEARNING PROCESS

Move beyond memorizing and learn to internalize and use information