

**FATS AND OILS APPLIED TECHNOLOGY FALL 2020 SYLLABUS**  
**FOS 6936 (2714) / FOS 4936 (18HD)**  
**Dual Level Course (Graduate & Undergraduate)**  
**3 units credit (2 units lectures; 1 unit Laboratory)**

**Lectures:** Location (To be Determined), Wednesdays at 10:40-12:25 AM

**Laboratory:** FSHN Bldg. Process Lab, Fridays at 10:40 - 12:25 AM

**Instructor:** Dr. Gloria Cagampang  
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**Office Hours:** (Wednesdays, Thursdays & Fridays at 7:30AM - 3:30 PM)

**Course Description:**

The course is designed for PhD, Masters, and graduating candidates in the Department of Food Science and Human Nutrition and it involves lectures and 15 hours of laboratory. The lectures deal on the basic science of the three leading vegetable fats and oils (soybean, canola and palm oils) with emphasis on their physicochemical and biochemical properties and their relevance on the processing, application and utilization in foods. The laboratory will involve elucidation of the knowledge gained in the lectures by actual processing of a specific food utilizing the functional fats developed by the class.

**Prerequisites:** Undergraduate courses in chemistry and organic chemistry.

**Objectives:**

1. To provide the general knowledge on the agronomy, production and trade of the current domestic and offshore oilseeds (soybean, canola and palm).
2. To provide the basics of the critical parameters involved in the extraction, refining, bleaching, deodorization of fats and oils and their modifications (blending, interesterification, emulsification, votation, fractionation and genetic manipulation) into functional shortenings and the subsequent handling and the preservation of their quality.
3. To provide the basic chemistry of fats and oils with focus in the understanding of the relevance of their physicochemical and biochemical properties in their functions as ingredients in foods.

4. To provide knowledge and understanding of the changes and reactions of fats and oils in the food system influencing the stability of the finished food.
5. To provide the fundamentals of the metrics for assessing the quality of fats and oils that are relevant to the safety of their usage as ingredient in the food system.
6. To provide the updated knowledge on the nutritional and health benefits of fats and oils focusing on the myths and realities of the ingredients.
7. To provide hands on experience in the differentiation of the functionality of fats and oils as applied in the food system.

**Format:** Lectures will involve discussions on relevant issues and further clarifications on the topics. Laboratory exercises will provide actual evaluation of the properties of the specific fats blended in the laboratory and their performance on the quality attributes of the processed food. All lecture materials are posted in Canvas.

**Exams:** Two written exams involving the application of the knowledge gained in the lectures and discussions. The schedule of the exams will be determined.

<b>Grading:</b>	<b>Percent of Grade</b>
Written examinations (2) -----	80
Attendance and participation -----	10
Laboratory (Shortening Preparation and Testing in the food ) .....	10

The current grading system of the University of Florida that includes the use of minus grades will be followed.

**Textbooks and Reference Materials:**

1. Erham, S.Z. 2005. Industrial uses of vegetable oils. AOCS Press, Champaign, Illinois. ISBN 1-893-997-84-7.
2. Firestone, D. 2006. Physical and chemical characteristics of oils, fats, and waxes. 2<sup>nd</sup> Ed. AOCS Press. ISBN 978-1-893997-99-8.
3. Frankel, E.N. 2007. Antioxidant in food and biology. The Oily Press, England. ISBN 978-0-9552512-0-7.
4. Gunstone, F.G. 2004. Rapeseed and Canola Oil. CRC Press. ISBN 0-8493-2364-9.
5. Gupta, M. K. 2008. Practical guide to vegetable oil processing. AOCS Press, Urbana, Illinois. ISBN978-1-893997-90-5. **Amongst all the listed references, this book is highly recommended for additional reading.**
6. Hui, Y.H. 1996. Bailey's Industrial oil and fat products. 5<sup>th</sup> Ed. Volume 4. John Wiley & Sons, Inc. ISBN 0-471-59428-8.

7. Johnson, L.A. 2008. Soybeans: Chemistry, Production, Processing & Utilization. AOCS Press, ISBN 978-1-893997.
8. List, G. 2009. Bleaching and Purifying Fats and Oils Theory and Practice. AOCS Press. ISBN 978-1-893997-91-2.
9. List, G and King, J. 2010. New Hydrogenation of Fats and Oils, Theory and Practice. AOCS Press. ISBN 978-1-893-997-93-6.
10. Liu, K. 1997. Soybeans : Chemistry, Technology, and Utilization. Chapman and Hall
11. Moreau, A.R. and Kamal-Eldin, A. 2009. Gourmet and Health-Promoting Specialty Oils. AOCS Press. ISBN 978-1-83997.10.
12. Shahidi, F. and Finley, J.W. 2001. Omega-3 fatty acids. Chemistry, Nutrition, and Health Effects. American Chemical Society, Washington, D.C. ISBN 0-8412-3688-7.
13. Watson, R. and Preedy, V. 2008. Tocotrienols Vitamin E Beyond Tocopherols. AOCS Press. ISBN 978-1-420080-37-7.

**Additional reading titles:**

- Chemistry and Technology of Oils and Fats. 2003
- Fats and Oils: Formulating and Processing for Applications. 2008
- Palm Oil: Production, Characterization, and Uses. (AOAC Monograph Series on Oilseeds). 2012
- The Oil Palm. 2012
- Processing and Nutrition of Fats and Oils. 2013

**Course Content:**

1. Chemistry of fats & oils (emphasis on soybean, canola, and palm oils)
2. Evolution of business initiatives: Functionality of fats & oils in Food Systems
3. Supply chain and trade challenges
4. Processing of fats and oils
  - a. Extraction
  - b. Refining
  - c. Bleaching
  - d. Deodorization
  - e. Storage & Handling
5. Modifications of fats & oils into functional shortening
  - a. Blending
  - b. Emulsification
  - c. Interesterification
  - d. Votation
6. Stability of fats & oils
7. Heart Healthy fats & oils : Information on health benefits

- a. Regular and High Oleic Palm oil
  - b. Regular and High Oleic Canola oil
  - c. Regular and High Oleic Soybean oil
8. Health and Nutritional Studies
- a. Loders Croklaan
  - b. University of Florida
  - c. Trans fats & other regulatory policies
10. Laboratory Exercise
- a. Blending of shortening by emulsification
  - b. Baking & Quality Assessment of the food

**Lecture Schedules: Refer to the List**

**Protocol during classes & laboratory:**

1. Turn off cell phones. Stop by and check attendance list.
2. Raise hands for discussions, clarifications, & questions : The course is meant to be interactive. One conversation at a time.
3. Enough time will be provided for note taking.
4. **During the laboratory, pay full attention in the use of the equipment (SAFETY !). Wear apron, safety goggles & disposable gloves. Clean up the place after the exercise.**