UNIVERSITI TEKNOLOGI MARA

CMT669: OLEOCHEMISTRY AND TECHNOLOGY

Course Name (English)	OLEOCHEMISTRY AND TECHNOLOGY APPROVED
Course Code	CMT669
MQF Credit	3
Course Description	Oleochemicals are made from vegetable and animal oils and fats and/or petrochemical feedstocks. They range from fatty acids, glycerine, alcohols and metallic soaps to fatty nitriles and their derivatives. This course towards providing the foundation in the various processes involve in oleochemistry. It covers the formation of basic oleochemicals such as Fatty Acids, Fatty Acid Methyl Esters (FAME), Fatty Alcohols, Fatty Amines and glycerol through enzymatic chemical reactions. It also includes the production of upstream chemical products derived from oleochemical feedstocks. The application of basic oleochemical products is also discussed including brief visits to commercially available oleochemical plants around the Klang Valley.
Transferable Skills	The knowledge and importance/application of basic oleochemicals and its derivatives in industries and our lives
Teaching Methodologies	Lectures
CLO	CLO1 Explain the source, physical and chemical properties of fatty acids, fatty acids methyl esters, fatty alcohols, fatty amines and glycerols. CLO2 Describe the production and techniques of fat splitting and oil modification processes. CLO3 Explore the oil modification processes and pre-treatment of various crude fatty acids. CLO4 Discuss the application of oils and fats in food and non-food industry as well as in other industries CLO5 Organize a field trip to the oleochemical-related industry CLO6 Compile the information gathered during the field trip for report writing
Pre-Requisite Courses	No course recommendations

Topics
1. Introduction to Oleochemistry 1.1) Lipids: classification, sources, physicochemical properties and functional properties of oil/ fats 1.2) Application of oleochemistry
2. Fatty Acids & Derivatives 2.1) Introduction: types and structures of fatty acids and triglycerides Tyndall effect 2.2) Fatty Acid Methyl Esters: production of methyl esters, the application of methyl esters e.g alcanolamide, fatty acids, isopropyl ester, biology fuel, other esters of fatty acids e.g structures lipids, replacement fats, organic monoacylglycerol, fatty acid esters 2.3) Fatty Alcohols: sources, physical and chemical characteristics, highly saturated aliphatic alcohols, unsaturated acyclic alcohol, application. 2.4) Fatty Amines: fatty nitrile, primary, secondary, tertiary and quaternary fatty amine, application
3. Glycerols & Production 3.1) Refining of raw material e.g fat splitting, bleaching of glycerine 3.2) Distillation e.g purification of raw glycerine through distillation and ionic exchange 3.3) Applications

4. Fat splitting and Pre-treatment of Fatty Acids 4.1) Fat splitting: Twitchell process, batch autoclave, enzymatic process, continuous process. 4.2) Refining 4.3) Degumming 4.4) Neutralization 4.5) Bleaching 4.6) Deodorization
5. Oil Modification Processes 5.1) Introduction 5.2) Hydrogenation 5.3) Interesterification 5.4) Fractionation
6. Application of Oils and Fats in Food Industry 6.1) Specialty fats 6.2) Margarine 6.3) Butter 6.4) Food-grade surfactant
7. Application of Oils and Fats in Non-food Industry 7.1) Soaps and detergents 7.2) Personal care products 7.3) Paints and coatings
8. Potential application of oils and fats 8.1) Biofuel: eg castor oil, palm oil, vegetables oil 8.2) Lubricants: vegetables oil as lubricant, application industries

Assessment Breakdown	%
Continuous Assessment	60.00%
Final Assessment	40.00%

Details of Continuous Assessment

Assessment Type	Assessment Description	% of Total Mark	CLO
Group Project	Assignment	15%	CLO6
Group Project	Assignment	15%	CLO5
Test	Test	30%	CLO1

Reading List

Recommended Text

- **Gunstone, F. D, Harwood, J. L & Dijkstra, A. J 2007, *The Lipid Handbook*, CRC Press**
- **Gunstone, F. D. and Norris, F. A. 1983, *Lipids in Foods, Chemistry, Biochemistry and Technology*, Pergamon Press**

Article/Paper List

This Course does not have any article/paper resources

Other References

- **Book Hamm, W. and Hamilton, R.J 2000, *Edible oil processing*, CRC Press**
- **Book Gunstone, F. D. 2004, *The chemistry of oils and fats*, CRC Press**