London South Bank University

MODULE GUIDE

FOOD COMPOSITION, PROPERTIES AND ANALYSIS

EAC-5-408

SCHOOL OF APPLIED SCIECNCE

2015-2016

LEVEL 5

MODULE LEADER: Dr Delia Ojinnaka

This module guide is designed to help you structure your learning by providing an indicative structure and content for the module. It is a guide and not a definitive statement of what you will be taught. We will try to follow this published schedule as far as possible, but there may be some variation as the module develops and as we try to match the pace and content of our teaching to student needs.

1.0 MODULE DETAIL	
Module Title:	Food Composition, Properties and Analysis
Module Level:	5
Module Reference Number:	EAC-5-408
Credit Value:	30 (CAT points)
Student Study Hours:	300 hours
Contact Hours:	90 hours
Private Study Hours:	210 hours
Pre-requisite Learning (If applicable)	Foodology
Co-requisite Units (If applicable):	None
Course(s):	BSc Food Science BSc (Hons) Food and Nutrition BSc (Hons) Applied Science
Year and Semester	Year 2, Semesters 1 & 2
Module Coordinator:	**Dr Delia Ojinnaka**
UC Contact Details (Tel, Email, Room)	**Dr Delia Ojinnaka (Office:** B144; **Telephone:** 0207 815 6255; **E-mail:** ojinnad@lsbu.ac.uk)
Teaching Team & Contact Details	**Dr Amar Aouzelleg** Office: B146; Ext 7945 direct line: 020 7815 7945 e-mail: aouzella@lsbu.ac.uk **Ms Adri Bester** Office: B147; Ext: 8132 direct line: 020 7815 8132 e-mail: bestera@lsbu.ac.uk **Ms Mandy Maidment** Office: B232; Ext 7901 direct line: 020 7815 7937 e-mail: maidmem@lsbu.ac.uk **Library Information** **Michael Veitch (Perry Library; Telephone:** 0207 815 6661; **E-mail: veitchm@lsbu.ac.uk)**
Subject Area:	Food and Biosciences

Summary of Assessment Method:	This module will be assessed by an end of module examination and by coursework. The weighting of the two elements will be 60 % examination and 40 % coursework. The coursework will be based on a laboratory report that integrates the different practical sessions and an essay on a specific topic. In order to **pass** the module, students are required to attain an **overall aggregate of 40%** for the assessments weighted as above. In addition, students are required to attain a **minimum threshold** of 30% for the examination and 30% for the coursework

2.0 SHORT DESCRIPTION

This module builds on an understanding of the chemistry of biological molecules and applies these principles to explaining the nature, properties and behaviour of particular food macromolecules. Specific components will be used for illustration e.g. starch, lipids, proteins, pectin and fibre. The properties of many of these compounds can be influenced by functional chemicals called 'food additives'. The determination of all of these components in foods is essential for declaring compositional, nutritional and labelling information and therefore the module will include practical learning material explaining the methods of analysis. Proximate and sensory analysis will form the major aspect of the laboratory analysis.

3.0 AIMS OF THE MODULE

- To explain the chemical composition of main food macromolecules
- To relate the chemical composition of food macromolecules to their properties and behaviour in food systems.
- To provide an overview of the additives used in foods.
- To explain the chemical principles and practice of proximate analysis.
- To demonstrate good laboratory practice and to encourage students to develop the analytical skills necessary for the chemical analysis of foods.

4.0 LEARNING OUTCOMES

4.1 KNOWLEDGE AND UNDERSTANDING

On completion of the module, students will be able to:

- to draw the chemical structures of carbohydrates, proteins and lipids.
- to explain the properties and behaviour of food macromolecules with respect to particular structural features.
- to explain the properties and functions of some micronutrients; vitamins and mineral elements.
- to give a diagrammatic classification of lipids and to draw the structures of glycerides, phospholipids, sterols, ethers and waxes.
- to explain rancidity in terms of changes to chemical composition.

- to classify food additives in terms of chemical and technological function.
- to describe the most widely used methods for the analysis of the proximate constituents and additives in food materials.
- to perform selected proximate and sensory analyses in the laboratory in a safe and competent manner.

4. 2/3/4 INTELLECTUAL, PRACTICAL AND TRANSFERABLE SKILLS

In addition to specific subject knowledge, this module is designed for the student to gain a number of key and cognitive skills.

Communication skills will be developed by participation in discussions and tutorials, presenting ideas within the group and in written assignments. Further reading of subject material will broaden the technical vocabulary and allow the students to use the particular jargon and terminology in this subject area with confidence. The subject area of food analysis is developing fast and reflecting changes in the way in which **information and communication technology** is utilised. Use of the internet and food science databases will help the students to demonstrate the awareness of **information access and management**.

Study at Level 5 will not only provide new knowledge areas but will also require students to **synthesise ideas** from different areas and select the information that best supports their argument. Thus developing the skills of **critical analysis**. At Level 5 students are expected to take more responsibility for organising their learning and selecting the resources that best support their studies. This makes the student an **independent learner** and prepares him / her for **continued independent study**.

5.0 ASSESSMENT OF THE MODULE

ASSESSMENT METHODS /COURSEWORK

The coursework will comprise of a 2 hour in-lab practical investigation (30%) and a very short laboratory report (10%). The relative weighting of the two elements is 60% for the written examination and 40% for the courseworks.

INSTRUCTIONS

THE IN-LAB PRATICAL ASSESSMENT:

Knowledge, understanding and practical skills

- Good description of the principle of the technique.
- Correct use of various analytical apparatus and instruments.
- Satisfactory interpretation and evaluation of the data or result generated.
- Good application of health and safety precautions in the laboratory.
- Demonstration of the ability to follow a laboratory schedule and instructions effectively.
- Demonstration of the ability to use gravimetric and volumetric method

THE SHORT LABORATORY REPORT

Word length: The limit is 500. References and bibliographies will not count towards the word length. Any work beyond the word length will not be marked.

Presentation
The coursework must be word-processed, double-spaced and paginated.

Plagiarism Please note that this is a serious issue, refer to the University regulations for further details. Avoid **plagiarism.**

SUBMISSION: A hardcopy must be submitted through the Faculty Office and an electronic copy must be submitted to the module leader.

Submission
Please **do not** put your name on the course work, use your student number. Please submit electronic and hard copies. Please retain a copy of the course work submitted.

Please stick to the specifications and avoid late submission.
Late submission will be considered in the light of a valid mitigating circumstance. You should obtain extension from the Course Director. Submission of assignment is through the School Office only.

Marking Criteria For the In-Lab Assessment

The following will be assessed; knowledge, understanding, structure, references, grammar and spelling. The learning outcomes should be shown clearly. The assignment should be concise, structured and well written.

6.0 FEEDBACK
Feedback will be given to students 10 to 15 working days after the submission of an assignment.

7.0 INTRODUCTION TO STUDYING THE MODULE

7.1 OVERVIEW OF THE MAIN CONTENT / INDICATIVE CONTENT
Macronutrients and Proximate Analysis
Structure of the major macronutrients; carbohydrates, proteins and fats. Review of the most important methods available for the determination of the macronutrient constituents of foods. Problems associated with these analytical methods as applied to different classes of foodstuffs.

Micronutrients
Review of the diversity of form and stability of vitamins in foods. Chemical and chromatographic methods of analysis. Quality assurance in the analysis of trace elements.

Additives

The role of food colourings, preservatives, emulsifiers and antioxidants in foods. Review of the analytical methods used for their determination.

Food Properties and Behaviour
This section will consider in detail the features, attributes and characteristics of food which are detected by the senses through a broad introduction to each of the sensory properties. Broad description of the physical and chemical phenomena responsible for the properties will be demonstrated through laboratory experiments involving sensory and instrumental methods.

Fundamentals Of Food Analysis
Sampling and sample preparation. Significance of analytical results, accuracy, precision, sensitivity, limits of detection. Quality control in analysis, calibration, standards, recovery, certified reference methods and accreditation. Use of blanks, standard samples and reference materials. Good laboratory practice and its importance in analytical measurement. Data collection, presentation and interpretation.

7.2 TEACHING AND LEARNING PATTERN / OVERVIEW OF TYPES OF CLASSES

The teaching and learning methods employed in this module will include lectures, tutorials and practical classes. The lecture time will be used in a variety of ways e.g. to introduce a topic, for discussion sessions and for working on interactive handouts. There will be two, separate hours of lectures each week
The tutorials will concentrate on the interpretation of analytical data and problem solving. There will be a tutorial class following the lectures each week. This module guide includes topics for eight tutorial sessions; in addition you will be guided through past examination questions.

The practical classes will focus on the practical applications of the techniques and encourage group work and good laboratory practice. In total, there will be twelve practical sessions each of approximately 3 hrs. Private study time will be used for guided reading, student centred learning, interpreting data and completing assignments. In addition, there will be two 1 hour revision sessions in the last week of the module.

Students are advised to do some background reading on a given topic prior to the lecture. The lecture materials are given in advance to encourage and assist self-learning. Students may also be required to prepare short topics for class presentation.

7.3 IMPORTANCE OF STUDENT SELF-MANAGED LEARNING TIME

Students are advised to do some background reading on a given topic prior to the lecture class. The lecture materials are given in advance to encourage and assist self- learning. Students may also be required to prepare short topics for class presentation.

7.4 EMPLOYABILITY

A knowledge of effective food hygiene and food preservation is central to all safe and successful food operations in all sectors of the food industry. The module is therefore considered core to the

food programme being offered, and the knowledge and learning experience gained through this module will be essential for students wanting to pursue a graduate career in the food and drink industry here in the UK / Europe and abroad.

8.0 THE PROGRAMME OF TEACHING, LEARNING AND ASSESSMENT

Week No.	Key Topics	Lecturer	Lecture	Lab	Tutorial
1	***Introduction To The Module***	*DO*	√		
1	***Introduction To Food Composition***	*DO*	√		
2	***Introduction To Food Properties***	*DO*	√		
2	***Introduction To Food Analysis***	*DO*	√		
3	***Fats & Oils****--- structure, property, functions and oxidative rancidity.*				
4	***Fats & Oils:*** *rancidity tests and determination of fat in milk by Soxtec, Gerber and Rose Gottleib methods. FAME analysis of fatty acids.*			√ *rancidity tests*	
5	*Food Biopolymers - Polysaccharides; characterisation, structure, property, and applications.* *Analysis of carbohydrates.*		√		
6	***Food Biopolymers - Proteins-*** *an account of specific proteins; enzymes, casein, gelatine and* ***gluten.*** *Analysis of proteins- an account.*	*DO*	√	√ *Gluten vs gluten free evaluation*	
7	***Selected Food Additives*** *-- analysis and properties of preservatives, colours****,*** *emulsifiers and stabilisers.*	*DO*	√	√	
8	***Food Contaminants And Residues****—types, toxicity and analysis.*	*DO*	√		
9	***Micronutrients - vitamins***	*DO*	√		
10	***Micronutrients- minerals***	*DO*	√		
11	***Micronutrients- minerals - analysis***	*DO*	√		
12	***Food colours and Browning reactions.***	*DO*	√	√	
13	***In class assessment (test or presentation)***	*DO*	√		

14	***Proximate Analysis***	*DO*	√		
15	***Proximate Analysis***	*DO*		√	√
16	***Proximate Analysis***	*DO*		√	√
17	***Proximate Analysis***	*DO*		√	√
18	***Proximate Analysis***	*DO*		√	√
19	***Proximate Analysis***	*DO*		√	√
20	***Sensory Analysis***	*Amar*	*√ (1 hour)*	*√ (2 hours)*	
21	***Sensory Analysis***	*Amar*	*√ (1 hour)*	*√ (2 hours)*	
22	***Sensory Analysis***	*Amar*	*√ (1 hour)*	*√ (2 hours)*	
23	***Sensory Analysis***	*Amar*	*√ (1 hour)*	*√ (2 hours)*	
24	***Sensory Analysis***	*Amar*	*√ (1 hour)*	*√ (2 hours)*	
25	***Sensory Analysis***	*Amar*	*√ (1 hour)*	*√ (2 hours)*	***Food examination***
26	***INTRODUCTION TO FOOD RHEOLOGY*** *---parameters and viscosity measurements* ***Texture Analysis Rheological Analysis***	*DO*	√	√	
27	***Rheological Analysis***	*DO*		√	√
28	***Rheological Analysis***	*DO*		√	√
29	***PRESENTATION (assessed)***	*DO*	√		
30	***Revision***	***THE TEAM***			

9.0 STUDENT EVALUATION

Department of Applied Science
Module Review and Report of Student Questionnaire

Academic Session	2012/2013
Semesters	1 & 2
Module Title	Food Composition, Properties and Analysis
Module Reference Number	EAC -5 - 408
Subject Group Area	Food and Biosciences
Module Leader and Teaching Team	Delia Ojinnaka (28/30) Amar Aouzelleg (2/30)

Student Performance

Number of students taking this Module	5
Number of students passing in June	5
Average coursework mark (%)	72.6
Average exam mark (%)	42.4
Average module mark (%)	54.4

Student response to questionnaire (average scores)

Total number of responses received = 4

Question	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Score	4	3.5	4	4.6	4	3.5	3.8	3.6	3.8	4	4	4	4

Question	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
Score	3.2	3.5	4	4	3.5	3.5	4	3.5	4	4	4	3.8

THE SCORE

DISAGREE AGREE DOES NOT APPLY

1	2	3	4	5	6

Feedback: Comment on any questions scoring less than 3.

Indicate the main comments provided from the student feedback questionnaire.

- The students said that the unit was fun but that they do not like calculations.

Action Plan: *Describe any proposed changes to teaching, learning and assessment after discussion with the Subject Leader.*

No major changes, however more focus will be placed on the calculations by doing more tutorial sessions. The dislike for calculations is reflected in the marked difference between the coursework and examination marks.

SIGNATURE OF THE MODULE LEADER: Delia Ojinnaka.

DATE: 13th June 2012.

10.0 LEARNING RESOURCES

10.1 CORE READING MATERIALS

Unfortunately, there is no single book that covers the entire contents of this module and as such, the following may be used for referencing for individual topics. All these books are available in the Perry Library.

Food biochemistry and food processing [electronic resource]
Ames, Iowa ; Chichester : Wiley-Blackwell, 2012.

2nd ed. / edited by Benjamin K. Simpson ; associate editors, Leo M.L. Nollet ... [et al.].

Advances in food biochemistry [electronic resource] / editor, Fatih Yildiz
Boca Raton : Taylor & Francis, 2010.

Fat detection [electronic resource] : taste, texture, and post ingestive effects / edited by Jean-Pierre Montmayeur, Johannes le Coutre
Boca Raton : CRC Press/Taylor & Francis, c2010.

Food stabilisers, thickeners and gelling agents / edited by Alan Imeson
Chichester, U.K. ; Ames, Iowa : Wiley-Blackwell Pub., 2010

Physicochemical aspects of food engineering and processing [electronic resource] / edited by Sakamon Devahastin
Boca Raton : CRC Press, 2010.

Functional foods [electronic resource] ; concept to product / Guest editor M. Saarela
Cambridge, Woodhead Publishing Ltd, 2011.

2nd rev. ed.

Handbook of food proteins [electronic resource] / Guest editor G. O. Phillips, P.A. Williams
Cambridge, Woodhead Publishing Ltd, 2011

Advances in food biochemistry [electronic resource] / editor, Fatih Yildiz
Boca Raton : Taylor & Francis, 2010.

Chemical and biological properties of food allergens [electronic resource] / edited by Lucjan Jędrychowski, Harry J. Wichers
Boca Raton : CRC Press/Taylor & Francis, c2010.

Breaded fried foods [electronic resource] / P. Kumar Mallikarjunan, Michael O. Ngadi, Manjeet S. Chinnan
Mallikarjunan, P. Kumar, 1964-
Boca Raton [Fla.] : CRC Press, c2010.

Novel food processing [electronic resource] : effects on rheological and functional properties / edited by Jasim Ahmed ... [et al.]
Boca Raton, Fla. : CRC Press, 2010.

Food properties handbook [electronic resource] / edited by M. Shafiur Rahman

Boca Raton : CRC Press/Taylor & Francis Group, 2009.

2nd ed.

Handbook of food analysis instruments / edited by Semih Ötleş
Boca Raton, FL : CRC Press, c2009.

Molecular methods in food analysis : principles and examples / Leighton Jones
Jones, Leighton.
Chipping Campden : Campden & Chorleywood Food Research Association Group, c2000.

10.2 BACKGROUND AND OPTIONAL READING MATERIALS

Anderson, M. (2000) Food composition claims and legal status, Chandos, Oxford.
Ashurst, P. R. and Dennis, M. J. (ed., 1998) Analytical methods of food authentication, Blackie Academic & Professional, London.
Coultate, T. P. (2009) *Food : the chemistry of its components.* Cambridge, UK : Royal Society of Chemistry.
Crosby, N. T. and Patel, I. (1995) General Principles of Good Sampling Practice, RSC, UK.

Fox, Brian A. (Brian Anthony, 2006) Fox and Cameron's food science, nutrition & health.

Hodder Arnold, London ; Oxford University Press, New York .

Kirk, R. S. and Sawyer, R. (1991) Pearson's Composition and Analysis of Foods. 9th Edition, Churchill. UK.

Andres, V. J. (2004) Quality assurance for the food industry : a practical, CRC Press, Boca Raton, FL.
Association of Official Analytical Chemists Official methods of analysis of the AOAC (15th edition) (1990), AOAC , USA.
Belitz, H.-D. Grosch, W . and Schieberle, P. (2004). Food Chemistry, 3rd Edition, Springer-Verlag Berlin Heidelberg, New York.
James C.S. (1995) Analytical Chemistry of Foods. Blackie, Academic & Professional, UK.
Lawrence, F. (2004) Not on the label : what really goes into the food on your plate, Penguin, London.
McCance, R. A. (Ed: 2002) 'McCance and Widdowson's The Composition of Foods', 5th Edition, 3rd Reprint The Royal Society of Chemistry, Cambridge.

Darling, D. F. and Birkett, R. J. (1986) In *"Food Emulsion and Foams"*. (ed. E. Dickinson). Special Publication No. 58 pp1. Royal Society of Chemistry, London.

Dickinson, E. (1988) *Food Structure: Its Creation And Evaluation*. (ed. J.M. Blanshard & J.R. Mitchell), Butterworths, London, p4.

Food Standards Agency (2002) *McCance and Widdowson's The Composition of Foods*. Sixth summary edition. Royal Society of Chemistry: Cambridge.

Geissler, C.A. and Powers, H. J. (2005) *Human nutrition* [CD-ROM]: Edinburgh and New York: Elsevier.

Jones, L. (2000) *Molecular methods in food analysis : principles and examples.* Campden & Chorleywood Food Research, Chipping Campden.

Kuiper, H. A., Noteborn, H. P. and Peijnenburg, A. A. C. (1999) *Adequacy of methods for testing the safety of genetically modified foods*, The Lancet, Volume 354, Issue 9187, pp. 1315-1316.

Lean M. E. J. (ed.) (2006) *Fox and Cameron's food science, nutrition & health. .* London and New York: Hodder Arnold.

Lewis, M.J and Young, J.L. (1995) *Brewing*, 4th edition, New York & London: Chapman & Hall.

McNelis, N. (2001) The *role of the judge in the EU and WTO*. Lessons from the BSE and hormones cases.

O'Brien, M. (2000) *Have lessons been learned from the UK bovine spongiform encephalopathy (BSE) epidemic?*, International Journal of Epidemiology, Volume 29, Issue 4, pp 730-733.

Phillips, G. O., Wedlock D. J. and Williams, P. A. (ed.) (1993) *Gums and Stabilisers for the Food Industry Series* IRL Press, Oxford,Volumes 1 to 9.

Potter, N.N., and Hotchkiss, J.H. (1995) *Food Science,* 5th edition. New York & London: Chapman & Hall.

Remacle and B. Reusens (2004) *Functional foods, ageing and degenerative disease.* Cambridge, England: CRC Press, Boca Raton; Woodhead Pub. Ltd.

Shewfelt, R.L. (2009) *Introducing Food Science*. Boca Raton, London and New York: CRC Press, Taylor and Francis.

The International Food Information (2005) *Dictionary of food science and technology.* compiled and edited by the International Food Information, Blackwell Publishing, Oxford.

Tothill, I.E. (2003**).** *Rapid and on-line instrumentation for food quality assurance***.** Boca Raton : CRC Press, Cambridge: Woodhead,.

Varnam, A.H. and Sutherland, J.P. (1995) *Meat and Meat Products -Technology, Chemistry & Microbiology*. Chapman & Hall, New York & London.

Varnam, A.H. and Sutherland, J.P.(1995) *Milk & Milk Products -Technology, Chemistry & Microbiology.* Chapman & Hall, New York & London.

von Holst C., Honikel K.O., Unglaub, W., Kramer, G., and Anklam, E. (2000) *Determination of an appropriate heat treatment of animal waste using the ELISA technique: results of a validation study - heat inactivation proof of meat - and bone-meal prepared from by products of food processing using the ELISA principle.* Meat Science, January vol. 54, no. 1, pp. 1-7.

RELEVANT JOURNAL ARTICLES

FATS AND OILS

Fast detection of rancidity in potato crisps using e-noses based on mass spectrometry or gas sensors
Sensors and Actuators B: Chemical, Volume 106, Issue 1, 29 April 2005, Pages 67-75
M. Vinaixa, A. Vergara, C. Duran, E. Llobet, C. Badia, J. Brezmes, X. Vilanova, X. Correig.

Mechanisms by which flavonol aglycones inhibit lipid oxidation better than glycosylated flavonols in comminuted muscle tissue. *Food Chemistry, Volume 117, Issue 1, 1 November 2009, Pages 75-82*
Priya Kathirvel, Mark P. Richards.

Extracts of olive polyphenols improve lipid stability in cooked beef and pork: Contribution of individual phenolics to the antioxidant activity of the extract.*Food Chemistry, Volume 116, Issue 4, 15 October 2009, Pages 892-897.* Sharon DeJong, Maria Cecilia Lanari.

The effect of citric acid on the phenolic contents of olive oil. *Food Chemistry, Volume 116, Issue 3, 1 October 2009, Pages 617-623*. Bahar Aliakbarian, Fariba Dehghani, Patrizia Perego.

Detection of rancidity in freeze stored turkey meat using a commercial gas-sensor array system
Sensors and Actuators B: Chemical, Volume 116, Issues 1-2, 28 July 2006, Pages 78-84.

Carbonyl value in monitoring of the quality of used frying oils. *Analytica Chimica Acta, Volume 617, Issues 1-2, 9 June 2008, Pages 18-21*. Reza Farhoosh, Seyed Mohammad Reza Moosavi.

FOOD BIOPOLYMERS AND RHEOLOGY

Oral behaviour of food hydrocolloids and emulsions. Part 1. Lubrication and deposition considerations
***Food Hydrocolloids**, Volume 17, Issue 6, November 2003, Pages 763-773*. M. E. Malone, I. A. M. Appelqvist, I. T. Norton.

Oral behaviour of food hydrocolloids and emulsions. Part 2. Taste and aroma release. ***Food Hydrocolloids***, *Volume 17, Issue 6, November 2003, Pages 775-784*. M. E. Malone, I. A. M. Appelqvist, I. T. Norton

Rheological characteristics of some food hydrocolloids processed with gamma irradiation
Food Hydrocolloids, *Volume 21, Issue 3, May 2007, Pages 392-396*.Mahmut Dogan, Ahmed Kayacier, Erhan I.

Hydrocolloids as emulsifiers and emulsion stabilizers
Food Hydrocolloids, *Volume 23, Issue 6, August 2009, Pages 1473-1482*. Eric Dickinson

Evaluation of rheological properties of selected salt enriched food hydrocolloids
Journal of ***Food*** *Engineering, Volume 48, Issue 2, May 2001, Pages 157-167*
Michèle Marcotte, Ali R. Taherian, Maher Trigui, Hosahalli Swamy Ramaswamy

Effect of some hydrocolloids on the rheological properties of different formulated ketchups
Food Hydrocolloids, *Volume 18, Issue 6, November 2004, Pages 1015-1022*. Hilal Sahin, Feramuz Ozdemir.

Different hydrocolloids as bread improvers and antistaling agents
Food Hydrocolloids, *Volume 18, Issue 2, March 2004, Pages 241-247*
A. Guarda, C. M. Rosell, C. Benedito, M. J. Galotto.

Starch Use in Foods. *Starch (Third Edition), 2009, Pages 745-795*. William R. Mason.

Structure and conformation of acetan polysaccharide. *International Journal of Biological Macromolecules, Volume 19, Issue 3, October 1996, Pages 149-156*. C. **Ojinnaka**, A. J. Jay, I. J. Colquhoun, G. J. Brownsey, E. R. Morris, V. J. Morris.

Effect of deacetylation on the synergistic interaction of acetan with locust bean gum or konjac mannan
Carbohydrate Research, Volume 305, Issue 1, December 1997, Pages 101-108. Cordelia **Ojinnaka**, Geoffrey J. Brownsey, Edwin R. Morris, Victor J. Morris.

FOOD ADDITIVES, CONTAMINANTS AND RESIDUES

Sample preparation techniques for the determination of trace residues and contaminants in foods
*Journal of Chromatography A, Volume 1153, Issues 1-2, 15 June 2007, Pages 36-53***Chapter 1 Challenges in Chemical Food Contaminants and Residue Analysis**
Comprehensive Analytical Chemistry, Volume 51, 2008, Pages 1-27
Michel W.F. Nielen, Hans J.P. Marvin.

Application of emulsifiers/stabilizers in dairy products of high rheology. *Advances in Colloid and Interface Science, Volumes 123-126, 16 November 2006, Pages 433-437*. Shane N.D. Lal, Charmian J. O'Connor, Laurence Eyres.

Chapter 5 Advanced Sample Preparation Techniques for the Analysis of Food Contaminants and Residues
Comprehensive Analytical Chemistry, Volume 51, 2008, Pages 131-174
Pat Sandra, Frank David, Gerd Vanhoenacker

Chapter 2 International Regulations on Food Contaminants and Residues
Comprehensive Analytical Chemistry, Volume 51, 2008, Pages 29-76
Ioannis S. Arvanitoyannis

CHROMATOGRAPHY AND SPECTROSCOPY

Chemiluminescence detection in liquid chromatography: Applications to clinical, pharmaceutical, environmental and food analysis—A review. *Analytica Chimica Acta, Volume 640, Issues 1-2, 27 April 2009, Pages 7-28*. Laura Gámiz-Gracia, Ana M. García-Campaña, José F. Huertas-Pérez, Francisco J. Lara.

Sample preparation methods in the analysis of pesticide residues in baby food with subsequent chromatographic determination. *Journal of **Chromatography** A, Volume 1153, Issues 1-2, 15 June 2007, Pages 54-73*. Andrea Hercegová, Milena Dömötörová, Eva Matisová.

Theory and application of near infrared reflectance spectroscopy in determination of food quality
*Trends in **Food** Science & Technology, Volume 18, Issue 2, February 2007, Pages 72-83.*
Haiyan Cen, Yong He

Raman spectroscopy a promising technique for quality assessment of meat and fish: A review
***Food** Chemistry, Volume 107, Issue 4, 15 April 2008, Pages 1642-1651*. Ana M. Herrero.

Near infrared spectroscopy for on/in-line monitoring of quality in foods and beverages: A review
*Journal of **Food** Engineering, Volume 87, Issue 3, August 2008, Pages 303-313*. Haibo Huang, Haiyan Yu, Huirong Xu, Yibin Ying.

Classification of brandies and wine distillates using front face fluorescence spectroscopy
***Food** Chemistry, Volume 117, Issue 3, 1 December 2009, Pages 491-498*. Jana Sádecká, Jana Tóthová, Pavel Májek.

The use of front face fluorescence spectroscopy to classify the botanical origin of honey samples produced in Switzerland. ***Food** Chemistry, Volume 101, Issue 1, 2007, Pages 314-323*
R. Karoui, E. Dufour, J.-O. Bosset, J. De Baerdemaeker

Theory and applications of fluorescence spectroscopy in food research
*Trends in **Food** Science & Technology, Volume 6, Issue 3, March 1995, Pages 69-75*. Gale M. Strasburg, Richard D. Ludescher.

10.3 RELEVANT PERIODICALS

Advances in Food and Nutrition Research
Advances in Food Research
Encyclopedia of Food Sciences and Nutrition
Encyclopedia of Foods
Food and Chemical Toxicology
Food Chemistry
Food Hydrocolloids
Food Research International
Food Security, Poverty and Nutrition Policy Analysis
Food Texture and Viscosity (Second Edition)
Food Toxicants Analysis
Global Issues in Food Science and Technology
Infrared Spectroscopy for Food Quality Analysis and Control
Innovations in Food Packaging
Innovative Food Science & Emerging Technologies
International Journal of Food Microbiology
International Journal of Food Science and Technology.
Journal of Food Composition and Analysis
Journal of Functional Foods
Food Science and Technology
Microbiological Analysis of Food and Water
Trends in Food Science & Technology
Waste Management for the Food Industries

10.4 RELEVANT WEBSITES

http//www.codexalimentarius.net
http//www.food.gov.uk
http// www.fao.org.
http// www. ifst.org.

11.0 NOTES

11.1 PREVIOUS EXAM PAPER:

COURSE: **BSc Food & Nutrition**
BSc Food Science

MODE: **Full Time & Part Time**

YEAR: **2**

LEVEL: **5**

MODULE: **Food Composition, Properties and Analysis (EAC_5_408)**

DATE: **June 2014**

TIME:

DURATION: **2 hours**

INSTRUCTIONS TO CANDIDATES

Section A: Question 1 is compulsory. [40 marks]
Section B: Answer any three questions. [20 marks each]

SECTION A (Questions 1) This question is compulsory.

QUESTION 1

You are provided with samples of dried milk powder and fresh sausagemeat and were asked to produce a nutrition label for either sample, showing the values for energy and the major nutrients. Write a detailed description of suitable analytical methods that could be used for the determination of the energy and major nutrient values. Your account must include the safety precautions and necessary calculations.

[40 marks]

SECTION B (Questions 2-6) ANSWER ANY THREE QUESTIONS.

QUESTION 2

Food emulsions are naturally unstable and will show phase separation over a period of time. Discuss the factors that influence the separation.

[20 marks]

QUESTION 3

The concentration of vitamin C (as L-ascorbic acid) in fruit juices can be determined by the DCPIP (2, 6-dichlorophenolindophenol) titrimetric method. In such analysis, a solution consisting of metaphosphoric acid and ethylene diamine tetraacetic (EDTA) can be used as an extractant for the vitamin.

(a) Describe the principle of the method. **[8 marks]**
(b) Describe the roles of the reagents in the extractant. **[12 marks]**

QUESTION 4

Using glucose and other sugars as examples, define the following:

(a) the D and L configurations. **[5 marks]**
(b) the α and β configurations. **[5 marks]**
(c) epimerism **[5 marks]**
(d) functional isomerism **[5 marks]**

You must draw the structures.

QUESTION 5

Katy and her friend Joe bought a meal of fried fish and chips from the LSBU Best Cafe. They tasted some of the foods and complained that the flavor was off, oxidative rancidity was suspected. Describe two tests that you would use to confirm oxidative rancidity. **[20 marks]**

QUESTION 6

(i) Explain exactly what is meant by the concentration term "mol dm^{-3}". **[5 marks]**

Given that the relative molecular mass of fructose is 180, describe how you would prepare:

(ii) 1 dm^3 of a solution containing 1 mol dm^{-3} fructose. **[5 marks]**

(iii) 1 dm^3 of a solution containing 1 x 10^{-2} mol dm^{-3} fructose. **[5 marks]**

(iv) 100 cm^3 of a solution containing 1 x 10^{-2} mol dm^{-3} fructose. **[5 marks]**

THE END.

11.2 STANDARD FORMAT FOR LABORATORY REPORTS (by Dr Larry Richmond)

There are certain rules you should follow in all forms of scientific writing:

- Write in the past tense
- Avoid the use of 'I' or 'We'. Write in the passive tense.
- Always reference your source material fully.
- Use SI units only
- Species names should be given in full, written in italics e.g. *Homo sapiens*
- Chemical names should be written in full, together with the chemical abbreviation, the first time they are used e.g. sulphuric acid (H_2SO_4)
- **DO NOT** copy directly from practical schedules. **ALL** work must be your own.

The standard format for a scientific report is as follows:

- Title
- Abstract
- Introduction
- Methods
- Results
- Discussion
- References
- Appendices (where appropriate)

Title
The title should be brief and informative, explaining clearly what the report is about.

Abstract
The abstract should be a short (no more than 200 words) summary of the essential information from the report. It should set out the background, aims methods results and conclusions. The results and conclusions are the most important part of the abstract.

Introduction
The introduction should describe the background and aims of the investigation. It should clearly answer the following questions:

- What has been done before
- What still needs to be investigated
- Why is the work important
- What are the aims of the investigation

Methods
The method section should describe:

- What was done
- How it was done
- What equipment was used
- What statistical tests were used

If you have been working from a detailed practical schedule, do not copy the method but describe any changes that you made. You do not need to list every item used but you should record the details of any analytical instrumentation used – make, model and operating parameters.
You **do not** need photographs/diagrams of standard items of laboratory equipment.

Results

The results section should describe and show what was found, together with the analysis of the findings. **DO NOT** interpret or explain the results in this section.
The text should clearly explain the key features of the results and describe what is being shown in each table or graph. Refer to your tables etc. by number. e.g. Table 3, Graph 2

- Every table, graph or diagram should be clearly numbered, in sequence, and have a clear descriptive heading.
- Each table (including title) should fit on one page.
- Each column in a table must have a clear heading, including units of measurement.
- All graphs should be drawn using MS Excel (or equivalent software) – ensure you use the correct graph type for your data!
- Graphs should be large enough for data to be clearly visible.
- Variables must be plotted on the correct axis.
- Axes must be clearly and correctly labelled and units shown.
- Data points must be shown on graph.
- Where a regression line is fitted, the equation and R^2 value should be shown.
- Data and results of calculations should be shown to the same number of decimal places as the original measurements.
- Results of statistical analysis should state the name of the test, the test statistic, number of measurements and the level of significance accepted.

Discussion

The discussion should interpret and explain the results of the experiment and relate your findings to other published work.

- Summarise your key results, relating them to the stated aims.
- Discuss each finding in turn, relating to other work where relevant and explaining any differences you may have found from published and/or expected results.
- Identify areas where you had problems and/or potential sources of error (**DO NOT** simply blame poor results on 'human error' or the experiment being 'too difficult').
- Identify areas for improvement in the experimental design (**DO NOT** claim that automated/computerised apparatus would give better results) and suggest how the investigation might be continued.
- Conclude with a paragraph that summarises the key findings and their interpretation.

References

You should include a complete list of ALL the references that you cited in your text, using the Harvard System of referencing (http://www.library.lsbu.ac.uk/helpsheets/hs30.pdf).
References to web sites should include the **full** web address of the actual site used (not links from search engines) and the date and time the site was viewed.

Appendices

Your results section should contain the key data, but this may have been processed from a larger data set that is not included.

You may occasionally wish to include this raw data and/or additional information, such as print-outs from instrumentation, examples of calculations, etc. in your report for reference. This information should be placed in the appendices. Each type of information should be placed in its own numbered and clearly titled appendix.

Table 1: Measurements of lead, cadmium and biomass at increasing distances from the road.

Distance from Road (m)	Pb concentration (ppm)	Cd Concentration (ppb)	Biomass (g)
0	125		
10	118		
25	113		
50	97		
100	70		
250	7.5		

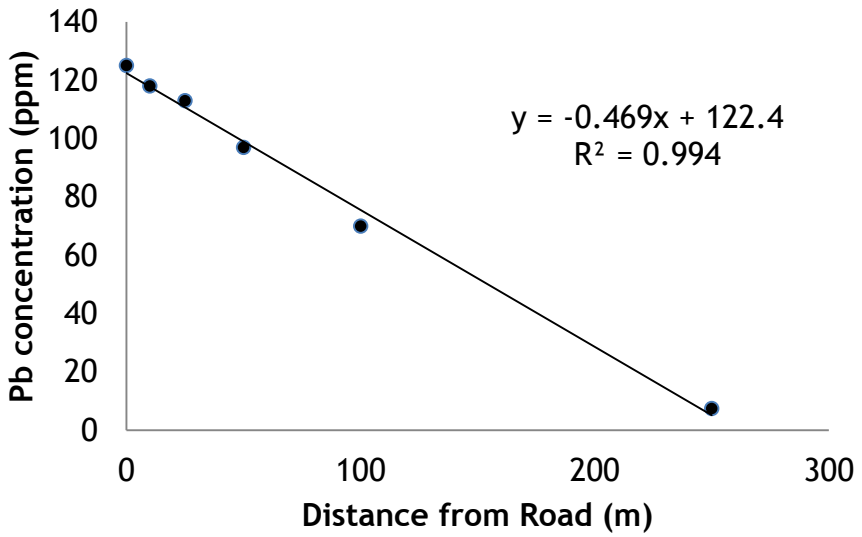

Figure 1: Scatter graph showing relationship between distance from road and lead concentration

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