CORK INSTITUTE OF TECHNOLOGY
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ

Semester 2 Examinations 2016/2017

Module Title: Nutritional Analysis

Module Code: **BIOL7018**

School: **Science and Informatics**

Programme Title(s): **Bachelor of Science (Honours) Herbal Science – Year 2**
Bachelor of Science (Honours) Nutrition and Health Science – Year 2
Bachelor of Science Applied Biosciences – Year 2

Programmes Code(s): **SHERB_8_Y2**
SNHSC_8_Y2
SBIOS_7_Y2

External Examiner(s): **Professor Nora O Brien**

Internal Examiner(s): **Dr Aoife McCarthy**
Dr Janette Walton

Instructions: ***Section A:*** *Short Questions:* Answer **all** questions in the space provided (50 marks)
Section B: *Long Questions:* Answer **two** questions in a separate answer book (50 marks)

Duration: 2 hours

Sitting: Summer 2017

Requirements for this examination:

Note to Candidates: Please check the Programme Title and the Module Title to ensure that you have received the correct examination. If in doubt please contact an Invigilator.

Section A: Short questions.

Answer <u>all</u> questions in the space provided. All questions carry equal marks. [50 marks]

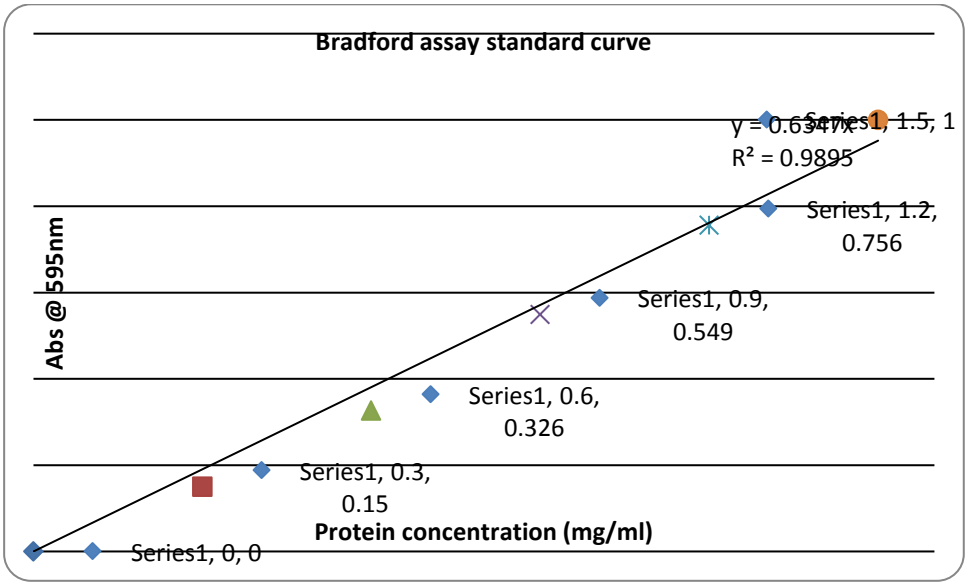
1. Distinguish between quantitative and qualitative assays.

2. Outline the Beer-Lambert Law.

3. A 25 ml solution of 0.1 M NaOH is titrated until neutralized into a 35 ml sample of HCl. What was the concentration of the HCl? *Note reaction equation is:* $HCl + NaOH \rightarrow NaCl + H_2O$

4. Outline the difference between the 'Heat of Combustion' and 'Atwater General Factor' values for the macronutrients.

5. Consider the graph below of protein concentration (mg/ml) versus absorbance.



A food sample was diluted 1 in 25 with deionised water. The absorbance reading for this sample was 0.7. What is the protein concentration (mg/ml) of the original food sample? Show all workings and calculations.

6. Calculate the energy content of a *20g serving* of a food containing 4.5g protein, 22g carbohydrate and 3g fat per 100g. Show all calculations clearly.

7. What is bioavailability?

8. A dietary supplement provides 1200mg of calcium per tablet. Following *in vivo* trials, it was found that absorption was 35% and 65% of this was retained in the system. Calculate the percentage (%) and amount (mg) bioavailable.

9. Give one example of an inhibitor of nutrient absorption. State the inhibitor, the nutrient whose absorption is affected by this inhibitor and the mechanism of action.

10. State the Acceptable Macronutrient Distribution Range (AMDR) for **each** macronutrient.

11. Distinguish between the terms 'recommendation' and 'requirement' in nutrition.

12.

i. Use the Harris-Benedict equation for females (given below) to calculate the resting energy expenditure (REE) for Mary, a 30-year old female with weight 65kg and height 1.63m. Show all calculations clearly.

REE females (kcal/day) = (weight (kg) x 9.56) + (height (cm) x 1.85) – (age (yrs) x 4.68) + 655.10

ii. Calculate Mary's estimated energy requirement (EER) given that Mary is sedentary. Show formula used and all calculations clearly.

13. Calculate the daily protein requirement for a 55-year old female, with weight 80kg and height 1.7m.

14. John is a 75-year old male with weight 65kg and height 1.5m. Calculate John's daily fluid requirement.

15. What are the **four** components of measuring an individual's nutritional status?

(i)

(ii)

(iii)

(iv)

16. Mr. Murphy is a 60-year old male with weight 81.82kg and height 185cm.
    Calculate **and** classify Mr. Murphy's body mass index (BMI). Show formula used and all calculations clearly.

17. What technique can be used to measure percentage body water of an individual?

18. Joan is an 18-year old female, whose waist circumference is 110cm and hip circumference is 95cm, giving her a waist-hip ratio (WHR) of 1.16. Is this a healthy WHR for Joan? Give a reason for your answer.

19. John is a 45-year old male. His usual weight is 135kg. In the last 2 months, John has lost 11kg. Calculate John's percentage weight loss. Show formula used and all calculations clearly.

20. Distinguish between static and functional biochemical tests. Give an example of each in your answer.

21. Write a short note on Menke's disease.

22. State **two** advantages and **two** disadvantages of the 24-hour dietary recall method of dietary evaluation.

    Advantages

    i.

    ii.

    Disadvantages

    i.

    ii.

23. Write a short note on potential consequences of excess dietary fibre consumption.

24. Briefly distinguish between hunger and appetite.

25. For each of the following abbreviations, state what each stands for **and** give a definition of the meaning.

    i. NOAEL

    ii. MTD

Section B: Long questions. Answer <u>two</u> questions in a <u>separate answer book.</u> [50 marks]

Q1.

(a) Describe with the aid of a labelled diagram, the Soxhlet assay for analysing the total lipid content of foods. (15 marks)

(b) Describe, with the aid of a labelled diagram, the apparatus used to analyse the energy content of food. (10 marks)

Q2.

(a) Outline

(i) the main method for analysing an individual's basal metabolic rate. (7 marks)

(ii) the main method for analysing an individual's protein requirements. (7 marks)

(iii) a biochemical method for analysing an individual's iron status. (5 marks)

(b) Outline the difference between EAR and RDA in terms of population nutritional requirements. Make use of an appropriate labelled diagram(s) to illustrate your answer. (7 marks)

Q3. Write a detailed evaluation of the use of an un-weighed food diary to assess an individual's dietary intake. In your answer include a description of the method, advantages and disadvantages, methods for quantification of the food consumed and converting dietary intake data into nutrient intake data. (25 marks)

Q4.

(a) Many external factors can influence the absorption of nutrients. Discuss **two** such factors and illustrate your answer with examples. (8 marks)

(b) Describe the methods available for measuring bioavailability *in vitro* and *in vivo*. In your answer include the benefits and limitations of the two approaches. (17 marks)