1. **Title of the module**

BI301 Enzymes and Introduction to Metabolism

1. **School or partner institution which will be responsible for management of the module**

School of Biosciences

1. **The level of the module (e.g. Level 4, Level 5, Level 6 or Level 7)**

Level 4 (Stage 1)

1. **The number of credits and the ECTS value which the module represents**

15 credits (7.5 ECTS credits)

1. **Which term(s) the module is to be taught in (or other teaching pattern)**

Spring

1. **Prerequisite and co-requisite modules**

Pre-requisite: BI300 Introduction to Biochemistry

1. **The programmes of study to which the module contributes**

Biochemistry and related programmes

Biology and related programmes

Biomedical Science and related programmes

1. **The intended subject specific learning outcomes.
On successfully completing the module students will be able to:**
	1. Analyse kinetic data and understand the principles of enzyme kinetics

(Programme Outcomes Biochemistry 11, Biomedical Science 9, Biology 7)

* 1. Discuss the basic structure and functions of enzymes.

(Programme Outcomes Biochemistry 5, Biomedical Science 6, Biology 9)

* 1. Perform enzyme assays to determine the kinetic properties of enzymes and to present the data in an appropriate manner.

(Programme Outcomes Biochemistry 10,22 Biomedical Science 27, Biology 6,22)

 8.4 Write down the key pathways of metabolism in animals and micro-organisms.

 (Programme Outcomes Biochemistry 1, Biomedical Science 2, Biology 7)

 8.5 Describe mechanisms of control of these metabolic pathways.

(Programme Outcomes Biochemistry 2, Biomedical Science 3, Biology 10)

1. **The intended generic learning outcomes.
On successfully completing the module students will be able to:**

9.1 Be able to extract and interpret information on a basic level (knowledge management).

 (Programme Outcomes Biochemistry 11,27, Biomedical Science 28, Biology 23)

9.2 Be able to use basic computer skills for use in spreadsheet work and data retrieval.

(Programme Outcomes Biochemistry 29, Biomedical Science 35, Biology 36)

9.3 Be able to analyse and evaluate data (problem solving) on a basic level.

 (Programme Outcomes Biochemistry 25, Biomedical Science 34, Biology 25)

1. **A synopsis of the curriculum**

This course aims to introduce the ‘workers’ present in all cells – enzymes, and their role in the chemical reactions that make life possible.

The fundamental characteristics of enzymes will be discussed – that they are types of protein that act as catalysts to speed up reactions, or make unlikely reactions more likely. Methods for analysis of enzymic reactions will be introduced (enzyme kinetics). Control of enzyme activity, and enzyme inhibition will be discussed.

Following on from this the pathways of intermediary metabolism will be introduced. Enzymes catalyse many biochemical transformations in living cells, of which some of the most fundamental are those which capture energy from nutrients. Energy capture by the breakdown (catabolism) of complex molecules and the corresponding formation of NADH, NADPH, FADH2 and ATP will be described. The central roles of the tricarboxylic acid cycle and oxidative phosphorylation in aerobic metabolism will be detailed. The pathways used in animals for catabolism and biosynthesis (anabolism) of some carbohydrates and fat will be covered, as well as their control. Finally how humans adapt their metabolism to survive starvation will be discussed.

1. **Reading List (Indicative list, current at time of publication. Reading lists will be published annually)**

# Lehninger principles of biochemistry - Nelson DL, Cox MM. New York : W.H. Freeman and Company Sixth edition, International edition. 2013

Fundamentals of enzymology: the cell and molecular biology of catalytic proteins - Price NC, Stevens L. OUP Third edition 1999, repr.2000

1. **Learning and Teaching methods**

Lectures 24h

Practicals and Workshops, 11h: There will be one 3 hour formative practical session followed by a 3 hour data analysis workshop. This will be followed by one 3 hour assessed practical on basic enzymology. These will be accompanied by two 1 hour prelab briefing sessions, before the first formative practical and before the assessed practical.

Self-study 115h: to include use of formative tests and resources available via Moodle, reading relevant material indicated in lecture notes, preparation for multiple choice test, exam, practical report production.

1. **Assessment methods.**

Assessed practical - enzyme kinetics (30%)

 In class test, 1h - metabolism (subject knowledge and its application; problem solving) (20%)

 Examination, 2h - covering both enzymology and metabolism (subject knowledge and its application; problem solving) (50%)

1. ***Map of Module Learning Outcomes (sections 8 & 9) to Learning and Teaching Methods (section12) and methods of Assessment (section 13)***

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Module learning outcome** |  | *8.1* | *8.2* | *8.3* | *8.4* | *8.5* | *9.1* | *9.2* | *9.3* |
| **Learning/ teaching method** | **Hours allocated** |  |  |  |  |  |  |  |  |
| Private Study | 115 | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |
| Workshop | 3 | **X** | **X** | **X** |  |  | **X** | **X** | **X** |
| Laboratory and pre-laboratory | 8 | **X** | **X** | **X** |  |  | **X** | **X** | **X** |
| Lectures | 24 | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |
| **Assessment method** |  |  |  |  |  |  |  |  |  |
| MCQ test | 1 |  |  |  | **X** | **X** | **X** |  | **X** |
| Practical | 3 | **X** | **X** | **X** |  |  | **X** | **X** | **X** |
| Exam | 2 | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |

1. **The School recognises and has embedded the expectations of current disability equality legislation, and supports students with a declared disability or special educational need in its teaching. Within this module we will make reasonable adjustments wherever necessary, including additional or substitute materials, teaching modes or assessment methods for students who have declared and discussed their learning support needs. Arrangements for students with declared disabilities will be made on an individual basis, in consultation with the University’s disability/dyslexia student support service, and specialist support will be provided where needed.**
2. **Campus(es) or Centre(s) where module will be delivered:**

Canterbury

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**Revision record – all revisions must be recorded in the grid and full details of the change retained in the appropriate committee records.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Date approved | Major/minor revision | Start date of the delivery of revised version | Section revised | Impacts PLOs (Q6&7 cover sheet) |
| 07/12/15 | Minor | January 2016 | 10, 12, 13 | No |
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