

# University of Pretoria Yearbook 2019

## Biocatalysis and integration of metabolism 357 (BCM 357)

<b>Qualification</b>	Undergraduate
<b>Faculty</b>	Faculty of Natural and Agricultural Sciences
<b>Module credits</b>	18.00
<b>Programmes</b>	BSc Biochemistry BSc Biotechnology BSc Chemistry BSc Genetics BSc Human Genetics BSc Human Physiology BSc Microbiology BSc Plant Science BSc Zoology
<b>Prerequisites</b>	BCM 251 and BCM 252 and BCM 261 or permission from the HOD
<b>Contact time</b>	2 lectures per week, 1 practical/tutorial per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Biochemistry, Genetics and Microbiology
<b>Period of presentation</b>	Semester 1

### Module content

Enzyme nomenclature and classification. Specificity and mechanisms: the active site, mechanisms of catalysis and examples of specific enzyme mechanisms, e.g. lysozyme and carboxypeptidase A. Advanced enzyme kinetics, Cleland nomenclature and multi-substrate reactions. Allosteric enzymes: models by Koshland, Hill and Monod. Ligands binding to proteins. Inhibitors of angiotensin converting enzyme (ACE). RNA as enzymes. Applications of enzymes in food and cosmetics industries and in clinical pathology assays as biomarkers of diseases and toxic responses. Elucidation of metabolic pathways. Antibiotic resistance mechanisms and development of new drugs. Hormonal regulation and integration of mammalian metabolism. Regulation of fuel metabolism after a meal, period between meals and starvation. Metabolic adaptations during diabetes. Obesity and the regulation of body mass. Obesity, metabolic syndrome and Type 2 diabetes (T2D). Management of T2D with diet, exercise and medication. Practical sessions cover tutorials on calculations, isolation of an enzyme, determination of pH and temperature optimum, determination of  $K_m$  and  $V_{max}$ , enzyme activation and enzyme inhibition. Computer simulations of drug design and protein docking to improve efficacy and lower toxicity.

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