SEMESTER II
LSM3242 TRANSLATIONAL MICROBIOLOGY

Prerequisite: **LSM2232 and either LSM2211 or LSM3232**
Workload: **26 lecture hours + 8 tutorial hours + 16 laboratory hours**

Course description:
This module covers the underlying principles and wide-ranging industrial, environmental, pharmaceutical, and biomedical applications of microbiology. The objectives are (a) to gain an understanding of the role of microorganisms for biotechnology applications in the fields of medicine, agriculture, organic chemistry, synthetic biology, public health, biomass conversion, and biomining; and (b) to review advances in genetics and molecular biology of industrial microorganisms, enzyme engineering, environmental microbiology, food microbiology, and molecular biotechnology. A particular focus will be on the meaning and impact of microbiology on human health and the development of new therapeutic approaches.

S/N	Topics	Lecture hours
1	**Introduction** • History • Microbes and cell cultivation – prokaryotic and eukaryotic cells	4 VP
2	**Public health - Nutrition** • An 'omics' toolbox to delve into the human microbiome • Intestinal microbiology in early life and its translation into nutritional concept: prebiotics, probiotics, and synbiotics • From industrial microbiology to a functional dairy food with health benefits • * Visit of Danone Nutricia Research, Singapore R&D centre	6 CL * CL, VP, SC
3	**Synthetic biology (Genetically engineered microorganisms)** • Cloning & genetic engineering • Production of recombinant proteins in bacteria and fungi • Selection and evolution of optimised proteins in microbial cells	6 SC
4	**Biotechnology** • Antibiotics & enzymes • Bio-mining/-leaching • Microbial functions in genetic therapy - genome editing	6 VP, SC
6	**Diagnostics, therapeutics, and vaccine development** • Microbes as antigens, diagnostics & therapeutics • Microorganisms as gene shuttles & for therapy of human diseases	4 VP, VC
	Total lectures : Tutorials : Laboratory :	26h 8h 16h
	Total hours :	**50h**

TEXT BOOKS (not compulsory):
Glazer & Nikaido, Microbial Biotechnology: Fundamentals of Applied Microbiology, 2nd ed. Cambridge Univ. Press. 2007
Lee YK. Microbial Biotechnology, Principles and Application, 2nd ed. World Scientific, Singapore. 2006
Black JG. Microbiology: Principles and Explorations, 6th ed. John Wiley & Sons, Hoboken. 2005

MODE OF ASSESSMENT:
40% Continuous Assessment: 1 Mid-term exam (MCQ) & 1 group work with presentation related to practical (each 20%)
60% Final Examination: MCQ and SAQ

MODULE CO-ORDINATOR:
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