數學系課程核心教材內容

<table>
<tr><td colspan="4">課程名稱：(中文) 生物數學
(英文) Mathematical Biology</td><td>開課單位</td><td>碩士班</td></tr>
<tr><td colspan="4"></td><td>課程代碼</td><td>2105735</td></tr>
<tr><td>學分數</td><td>3</td><td>必/選修</td><td>選</td><td>開課年級</td><td>一、二</td></tr>
<tr><td colspan="6">教學目標：
(一) 主要目標：Mathematical biology aims at the mathematical treatment and modeling of biological processes, using a variety of applied mathematical techniques and tools. This course will show how mathematics can be applied to a variety of models to draw interesting conclusions for biology.
(二) 次要目標：Emphasizing connections between diverse biological models and mathematical themes.

課程概述：(1) mathematical software；(2) population dynamics；(3) cellular biology；(4) pattern formation。

先修科目或先備能力：Advanced Calculus</td></tr>
<tr><td>建議參考書目</td><td colspan="5">1. “Mathematical Biology: I. An Introduction (3rd edition)”, by James D. Murray.
2. “Mathematical Biology: II (3rd edition)”, by James D. Murray.
3. “Essential Mathematical Biology”, by Nicholas F. Britton.
4. “Computational Cell Biology”, by Christopher Fall, Eric Marland, John Wagner, and John Tyson.
5. “Mathematical Physiology (2nd edition)”, by James Keener and James Sneyd.</td></tr>
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課程大綱

單元主題	內容綱要	上課週數
Differential Equations	Some techniques for ordinary differential equations and partial differential equations	2-3
Mathematical Software	An short introduction to mathematical software(e.g., Mathematica, Maple, Matlab, XPP, and AUTO)	2-3
Biological Motion	Macroscopic theory for motion, Taxis*, Biological invasions, and wave propagation.	4-6
Cellular Biology	Biochemical kinetics, Metabolic pathways, and Neural modeling.	4-6
Pattern Formation	Turing instability, Turing bifurcations, Activator-inhibitor systems, and Tumour modeling*.	4-6

*：Optional topics