編號： 275

# 國立成功大學 109 學年度碩士班招生考試試題

系　　所：生理學研究所

考試科目：生命科學

考試日期：0211，節次：1



※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. Please describe the cardiovascular system of "Frog" and its association with ventilation system. (10%)

2. Countercurrent amplification system plays a very important role in execution of physiological functions. Please describe how countercurrent amplification system is involved in urine concentration. (15%)

3. Please describe the structure and function of microRNA and lncRNA (long non-coding RNA). (10%)

4. 2019 Nobel Prize in Physiology/Medicine was awarded to three scientists whose works were associated with the identification of HIF1$\alpha$ as the cell oxygen sensor. Please describe how HIF1$\alpha$ is regulated under normal and hypoxic conditions. (15%)

5. "Dolly the sheep, the world's first mammal to be cloned from an adult cell was put to sleep last month. She was only six and a half years old – barely 40 in human terms. Already being treated for arthritis, Dolly was found to be suffering from a progressive lung disease. Normally, sheep can live to 11 or 12 years. Dolly's genetic mother, the one who gave Dolly her DNA, was six when she was cloned." What is the scientific rationale that causes the early death of Dolly? (20%)

6. In many cases, people react to the same drug differently due to subject variability. Do you know what causes such difference? Because of this variation, doctors are looking for using "precision medicine" to treat their patients. What is precision medicine? Please explain what elements are needed in order to achieve the so-called precision medicine era? (20%)

7. Taiwan has become the "aged society" as Taiwanese people over 65 years old accounted for 14.05% of the country's total population in 2018. In 2026, the percentage will further increase to 21%, a rate that is faster than any country in the world. What is the cause of this situation? And, in your opinion, what can you do to slow down this process? (10%)