

# 東吳大學 104 學年度碩士班研究生招生考試試題

第 1 頁，共 1 頁

系級	微生物學系碩士班 C 組(分子生物科技)	考試時間	100 分鐘
科目	分子生物學	本科總分	100 分

1. Compare and contrast the mechanisms of prokaryotic transcription and eukaryotic transcription. List two differences and two similarities. (10 分)
  
2. What is complementary DNA (cDNA)? Why would it be an advantage to synthesize cDNA in molecular cloning? (10 分)
  
3. How do promoters, operators, activators and repressors interact to regulate the expression of a particular gene? Draw a diagram to show their interactions. (10 分)
  
4. Changes in telomere structure and function occur during aging. Discuss. (10 分)
  
5. The technique of DNase I footprinting is used to precisely map protein-binding sites on DNA. Describe the principle and protocol of this technique. (10 分)
  
6. Molecular biology can provide valuable knowledge and important tools to multiple research fields. Give an example for the application of molecular biology in the field of food science and the environmental science. (10 分)
  
7. The eukaryotic genome is assembled into chromatin that can be regulated by acetylation. How does acetylation modify the chromatin and at which residuals does acetylation occur mostly? (10 分)
  
8. An *Escherichia coli* mutant has a partially defective DNA polymerase. The error rate of this mutant DNA polymerase is  $10^{-5}$  per base pair, as compared to the normal error rate of  $10^{-9}$  per base pair. Which of the following activities is the mutant polymerase likely to be missing? Choose all that apply and provide the reasoning. (10 分)
 

5'→3' polymerase	5'→3' exonuclease	5'→3' synthetase
3'→5' polymerase	3'→5' exonuclease	3'→5' synthetase
  
9. Explain the “cut-and-paste” mechanism of a DNA transposon. (10 分)
  
10. How do you make a 1.5% w/v agarose gel with a final Tris-Borate-EDTA (TBE) buffer concentration of 0.5X if your gel is 50 mL in volume and your stock TBE solution is 10X? (10 分)