

# 元智大學 102 學年度研究所 碩士班 招生試題卷

系(所)別： 生物與醫學資訊 組別： 不分組 科目： 生物資訊概論 用紙第 / 頁共 2 頁  
 碩士學位學程

●不可使用電子計算機

1. (5%) Which of the following items contain DNA?  
 (A) Chromosome (染色體) (B) Mitochondrial (粒線體) (C) Chromatin (染色質)  
 (D) Ribosome (核糖體) (E) Lysosome (溶酶體) (F) Chloroplast(葉綠體)
  
2. (10%) Please define the **central dogma of molecular biology** in eukaryotes and prokaryotes, and briefly describe their differences.
  
3. (16%) Please briefly introduce the following biological databases and tools: (任選 8 個子題)  
 (a) BLAST (Basic Local Alignment Sequence Tool) (f) UniGene (k) BioMart  
 (b) WebLogo (g) PubMed (l) dbSNP  
 (c) MEME (h) OMIM (Online Mendelian Inheritance in Men) (m)dbEST  
 (d) ClustalW (i) KEGG (n) miRBase  
 (e) Ensembl (j) InterPro (o) UniProt  
 (p) NCBI GEO (q) RNAFold
  
4. (8%) Please illustrate what are the **Exon, Intron, and Regulatory region** for a gene.
  
5. (6%) Please define the following terms: **Paralogs, Orthologs and Homology**.
  
6. (1) What is the amino acid? (5%) (2) Please illustrate the basic chemical architecture of an amino acid (5%). (3) Please translate the mRNA sequence AUGACUUGGUCAUUUAA into an amino acid sequence using following table (5%).

**Second base in codon**

		Second base in codon				
		U	C	A	G	
First base in codon	U	Phe	Ser	Tyr	Cys	U
		Phe	Ser	Tyr	Cys	C
		Leu	Ser	STOP	STOP	A
		Leu	Ser	STOP	Trp	G
	C	Leu	Pro	His	Arg	U
		Leu	Pro	His	Arg	C
		Leu	Pro	Gln	Arg	A
		Leu	Pro	Gln	Arg	G
	A	Ile	Thr	Asn	Ser	U
		Ile	Thr	Asn	Ser	C
		Ile	Thr	Lys	Arg	A
		Met	Thr	Lys	Arg	G
G	Val	Ala	Asp	Gly	U	
	Val	Ala	Asp	Gly	C	
	Val	Ala	Glu	Gly	A	
	Val	Ala	Glu	Gly	G	

Third base in codon

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7. Please explain the following terms: (1) Global alignment (5%), (2) Local alignment (5%), and (3) Semiglobal alignment (5%).
8. Let  $S_1 = \text{TGGACTTACTA}$  and  $S_2 = \text{AAGGACTA}$  and let the scores of match, mismatch and gap penalty be 1, -1, and -2, respectively. Please finish the following table used in the dynamic programming algorithm for computing the **local alignment** of  $S_1$  and  $S_2$  (10%), and enumerate the best local alignment between  $S_1$  and  $S_2$  (5%).

Local	$S_1$	T	G	G	A	C	T	T	A	C	T	A
$S_2$	0											
A												
A												
G												
G												
A												
C												
T												
A												

9. Please explain: (1) What is the microRNA? (5%) (2) How to identify the targets of microRNA by Bioinformatics method? (5%)