

BIOL B11 Assessment Data, Fall 2015

SLO # 3: DNA and Heredity: The students will be able to 1) understand the significance of DNA as the basis for heredity, structure, function and disease in living organisms: 2) describe the DNA molecule and explain how it is used in living systems to create proteins: and 3) describe how proteins function in living cells.

The following questions below were used to assess six sections of BIOL B11 during Fall 2015. The total number of students that completed this assessment is 145. The assessment data for all 6 sections were averaged and recorded below next to the appropriate question. To summarize, the average percentage score on each question were as follows:

a) 85% b) 75% c) 85% d) 75% e) 90% f) 90% g) 53%

DNA replication, transcription and translation are very difficult topics to master. Student understanding of these topics are usually weak among non-major biology students, so it was not surprising to see some low scores. This topic is only one of many covered in this class, and the overall success of students is dependent upon their understanding and performance in the entire class, so Biology 11 faculty feel the assessment scores above are mostly acceptable for this topic. Question "g" is a critical thinking question with a 53%, which is not acceptable. We will need to address this topic in future sections of biology 11 and reassess. To be as consistent as possible, each instructor administered this assessment with the appropriate unit exam.

Assessment Tool:

Each year in the United States alone, there are about 40,000 reported cases of *cystic fibrosis* (CF). This is a fatal genetic disorder that, at this time, is incurable. On average, CF individuals can expect to live no longer than thirty years. After many years of research, it is believed that this disorder may arise from a defective protein (*termed CFTR*) in the plasma membrane of gland cells that secrete mucus, digestive enzymes, and sweat. Based on our in-class discussions regarding protein synthesis and gene expression, correctly **transcribe** and **translate** the normal and mutated region of this CFTR (*cystic fibrosis*) gene below. (Please note, the DNA sequences listed below are the middle portion of the gene.)

normal CFTR sequence:

T A G T A G A A A C C A C A A

mutated CFTR sequence:

T A G T A A C C A C A A

a. Transcription: ____1.7 or (85%)__ (2 pts) (average score=total pts/n)
score=total pts/n)

c. Transcription: ____1.7 or (85%)__ (2 pts) (average

b. Translation: ____1.5 or (75%)__ (2 pts) (average score=total pts/n)
score=total pts/n)

d. Translation: ____1.5 or (75%)__ (2 pts) (average

Now, give the DNA strands that would be complementary to the **original** DNA (listed below for your convenience).

normal CFTR sequence:

T A G T A G A A A C C A C A A

mutated CFTR sequence:

T A G T A A C C A C A A

e. Complementary DNA: _____.9 or (90%)__ (1 pt) (ave. score=total pts/n) f. Complementary DNA: _____.9 or (90%)__ (1 pt) (ave. score=total pts/n)

g. Give a thorough explanation as to why the protein from the mutated gene does not function properly. (4 pts)

_____.2.1 or (53%)_____ (average score=total pts/n)

Number of sections assessed: 6

Total number of students (N) = 145