

The Genetic Codon Chart®

	U	C	A	G
U	UUU → Phe F (4) UUC → Phe F (4) UUA → Leu L (1) UUG → Leu L (1)	UCU → Ser S (3) UCC → Ser S (3) UCA → Ser S (3) UCG → Ser S (3)	UAU → Tyr Y (4) UAC → Tyr Y (4) UUA → Stop (3) UUG → Stop (3)	UGU → Cys C (2) UGC → Cys C (2) UGA → Stop (3) UGG → Trp W (1)
C	CUU → Leu L (1) CUC → Leu L (1) CUA → Leu L (1) CUG → Leu L (1)	CCU → Pro P (2) CCC → Pro P (2) CCA → Pro P (2) CCG → Pro P (2)	CAU → His H (1) CAC → His H (1) CAA → Gln Q (2) CAG → Gln Q (2)	CGU → Arg R (1) CGC → Arg R (1) CGA → Arg R (1) CGG → Arg R (1)
A	AUU → Ile I (3) AUC → Ile I (3) AUA → Ile I (3) AUG → Met M (2)	ACU → Thr T (2) ACC → Thr T (2) ACA → Thr T (2) ACG → Thr T (2)	AAU → Asn N (2) AAC → Asn N (2) AAA → Lys K (3) AAG → Lys K (3)	AGU → Ser S (1) AGC → Ser S (1) AGA → Arg R (1) AGG → Arg R (1)
G	GUU → Val V (1) GUC → Val V (1) GUA → Val V (1) GUG → Val V (1)	GCU → Ala A (2) GCC → Ala A (2) GCA → Ala A (2) GCG → Ala A (2)	GAU → Asp D (1) GAC → Asp D (1) GAA → Glu E (2) GAG → Glu E (2)	GGU → Gly G (1) GGC → Gly G (1) GGA → Gly G (1) GGG → Gly G (1)

Amino Acid Properties:
 Translation Start Codon: AUG
 Translation Stop Codon: UGA, UAG, UAA
 Hydrophobic / NonPolar: Phe, Leu, Ile, Val, Met, Ala, Gly, Pro, Thr, Ser, Asn, Lys, Arg, His, Gln, Cys, Trp
 Polar: Asp, Glu, Asn, Lys, Arg, His, Gln, Cys, Trp
 Positive Charge: Lys, Arg, His, Gln, Cys, Trp
 Negative Charge: Asp, Glu
 Sulfur: Cys, Met
 Aromatic: Phe, Tyr, Trp

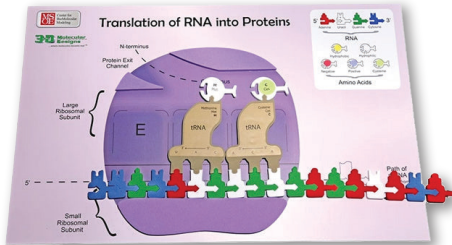
Decoding Messenger RNA

For Use With 3D Molecular Designs' **Genetic Codon Chart**



Proteins are made of unique sequences of **amino acids**. When building a protein, **DNA** is **transcribed** into **messenger RNA (mRNA)**, which is then **translated** into amino acids one **codon** (three mRNA bases) at a time.

Below is the **mRNA** sequence used in 3D Molecular Designs' **Flow of Genetic Information Kit®**. Using the codon chart to guide your work, complete the steps below:



1. Mark the **start codon** in the mRNA sequence
2. Underline each **codon** in the sequence
3. Translate the sequence into **amino acids**
4. Identify the **chemical properties** of each amino acid (see codon chart for recommended color scheme)
5. Change one **nucleotide** in a single codon and predict whether the mutation is **silent**, **missense**, or **nonsense**

Messenger RNA

C G C A U G U G U G A G A U A C A U U G G C C A A G A C A C

start codon → M C E I H W P R H

Amino Acid Sequence