Synthetic Biology Module 1
University of Rochester iGEM 2020

Checklist for Module #1

- ❑ Read the syllabus
- ❑ Read two linked articles from syllabus
  - ❑ What is the "Central Dogma"?
  - ❑ Overview of Genes, DNA, and Chromosome
- ❑ Open Google Form #1

Module overview

- Introducing the structure of the module. How the module is designed?
- Introducing the basic of genetics

Meet the instructors

Emily Schiller
Rising senior
Cell and Developmental Biology Major

Heather Shi
Rising junior
Microbiology Major

Linh Hoang
Rising junior
Biomedical Engineering Major

Meet the instructors

Meghan Martin
Rising senior
Biochemistry and American Sign Language major

Helen Shammas
Rising junior
Biomedical Engineering major

Module structure

- 9 modules in total
- Goal: learn about synthetic biology and its applications, impacts and techniques
- For those completed all modules and the assignments
    - Featured on our wiki page
    - Letter from out mentor, Dr. Meyer
    - A certificate from us

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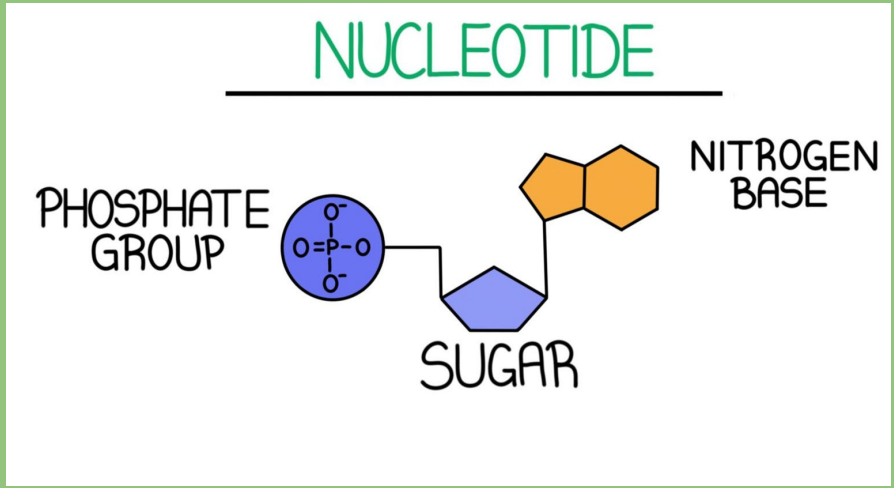
1. Read the articles linked on syllabus before each module
2. Watch the module
3. Do the activity and assignment after the module in google form and submit the google form (15-30 minutes). Will be getting feedbacks within 48 hours.

Nucleotide



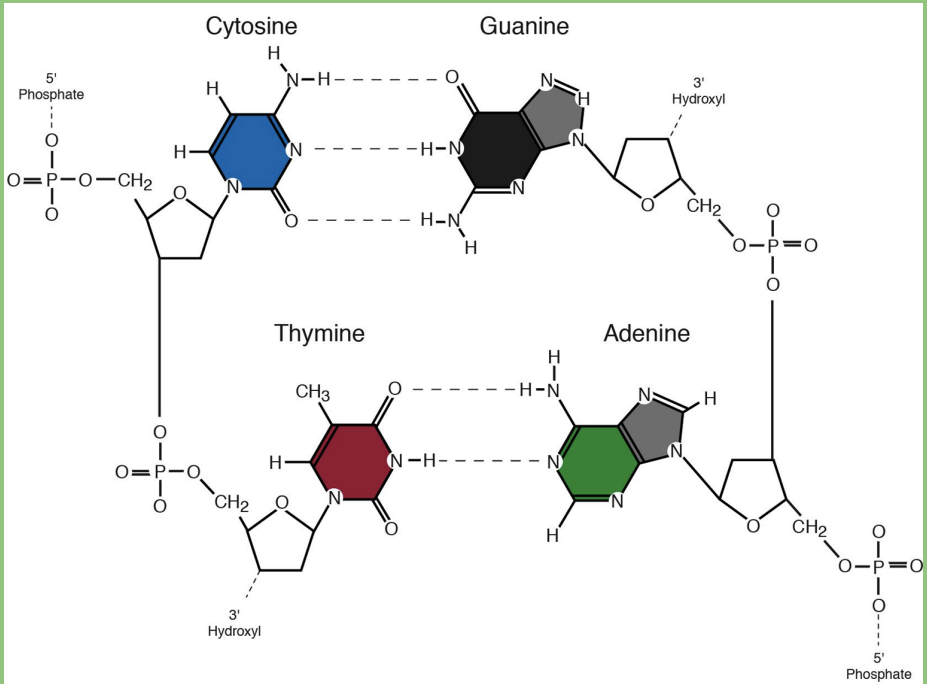


image: https://www.expii.com/t/dna-structure-overview-diagrams-10209; https://knowgenetics.org/nucleotides-and-bases/

What is …

- Gene
- DNA
- Chromosome
- Nucleus

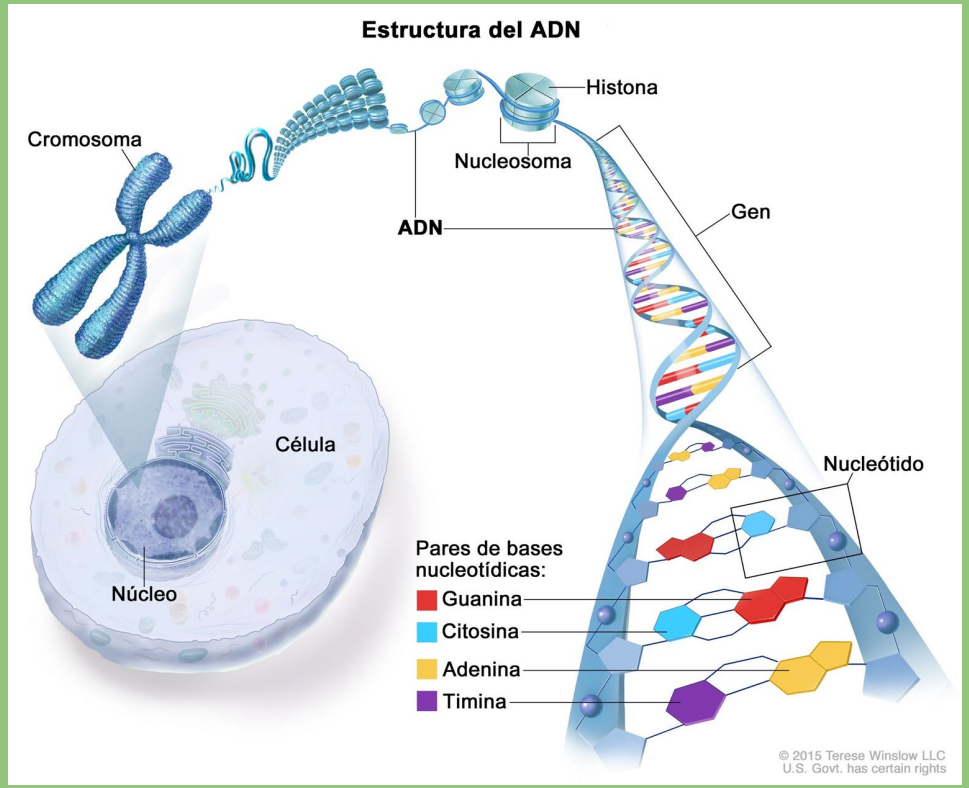


image: https://www.quora.com/What-is-the-relationship-between-DNA-genes-and-chromosomes

How is the gene expressed? central dogma

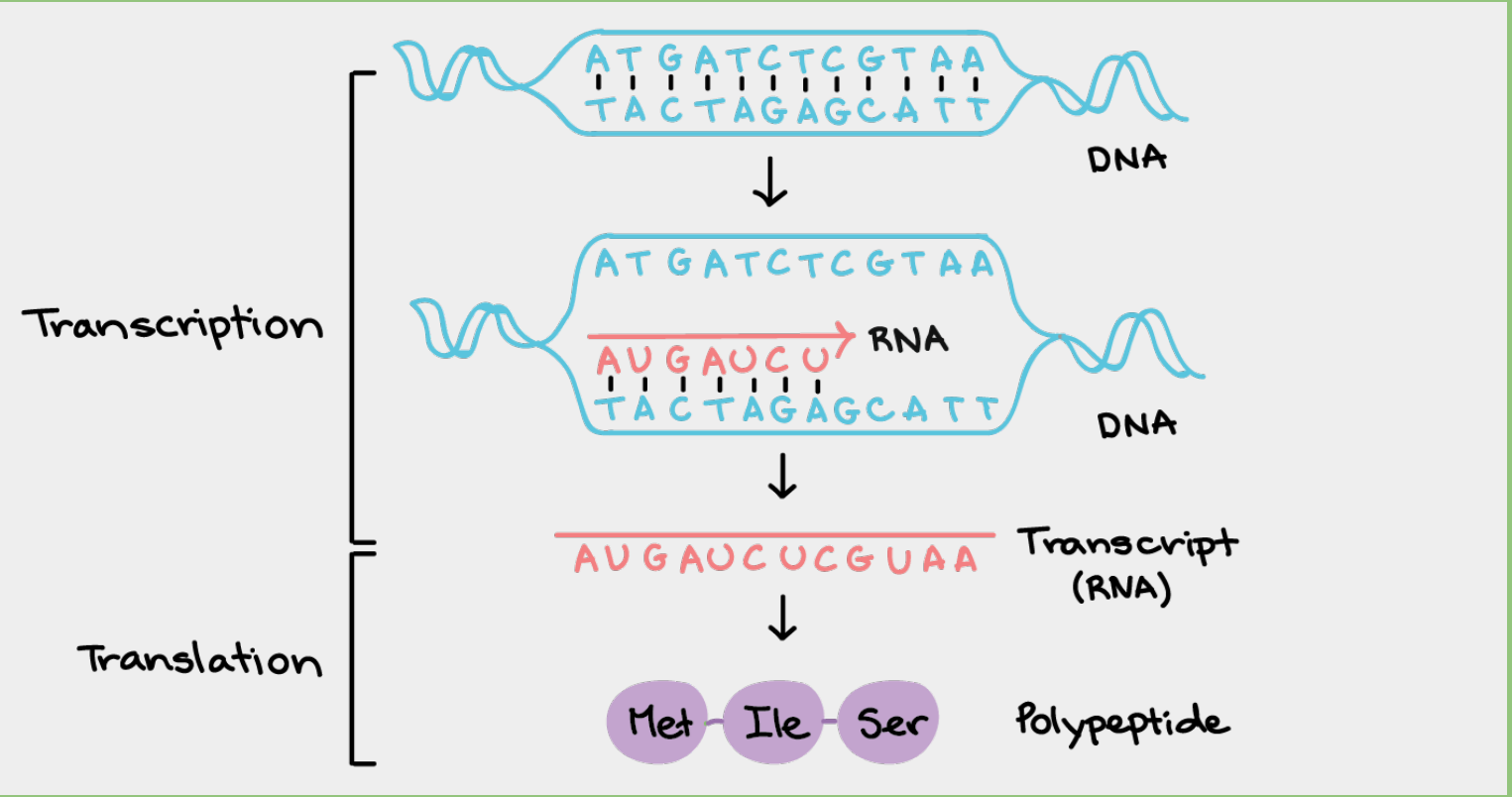


image: https://www.khanacademy.org/science/biology/gene-expression-central-dogma/transcription-of-dna-into-rna/a/overview-of-transcription

Basic structure of a protein-coding gene in Transcription

- Promoter
- RNA-coding sequence
- Terminator
- RNApolymerase

image: http://web2.mendelu.cz/af_291_projekty2/vseo/print.php?page=307&typ=html

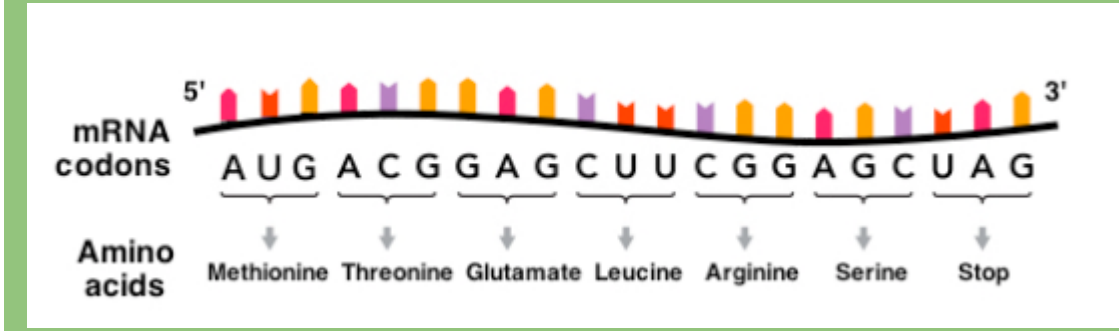
Translation

First letter	Second letter: U	Second letter: C	Second letter: A	Second letter: G	Third letter
U	UUU, UUC: Phe UUA, UUG: Leu	UCU, UCC, UCA, UCG: Ser	UAU, UAC: Tyr **UAA: Stop** **UAG: Stop**	UGU, UGC: Cys **UGA: Stop** UGG: Trp	U C A G
C	CUU, CUC, CUA, CUG: Leu	CCU, CCC, CCA, CCG: Pro	CAU, CAC: His CAA, CAG: Gln	CGU, CGC, CGA, CGG: Arg	U C A G
A	AUU, AUC, AUA: Ile **AUG: Met**	ACU, ACC, ACA, ACG: Thr	AAU, AAC: Asn AAA, AAG: Lys	AGU, AGC: Ser AGA, AGG: Arg	U C A G
G	GUU, GUC, GUA, GUG: Val	GCU, GCC, GCA, GCG: Ala	GAU, GAC: Asp GAA, GAG: Glu	GGU, GGC, GGA, GGG: Gly	U C A G

image: https://www.khanacademy.org/science/biology/gene-expression-central-dogma/translation-polypeptides/a/translation-overview

Translation

First letter	Second letter: U	Second letter: C	Second letter: A	Second letter: G	Third letter
U	UUU Phe UUC Phe UUA Leu UUG Leu	UCU Ser UCC Ser UCA Ser UCG Ser	UAU Tyr UAC Tyr **UAA Stop** **UAG Stop**	UGU Cys UGC Cys **UGA Stop** UGG Trp	U C A G
C	CUU Leu CUC Leu CUA Leu CUG Leu	CCU Pro CCC Pro CCA Pro CCG Pro	CAU His CAC His CAA Gln CAG Gln	CGU Arg CGC Arg CGA Arg CGG Arg	U C A G
A	AUU Ile AUC Ile AUA Ile **AUG Met**	ACU Thr ACC Thr ACA Thr ACG Thr	AAU Asn AAC Asn AAA Lys AAG Lys	AGU Ser AGC Ser AGA Arg AGG Arg	U C A G
G	GUU Val GUC Val GUA Val GUG Val	GCU Ala GCC Ala GCA Ala GCG Ala	GAU Asp GAC Asp GAA Glu GAG Glu	GGU Gly GGC Gly GGA Gly GGG Gly	U C A G



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Module review

- The structure of the module.
- What nucleotide, gene, DNA, Chromosome and nucleus are.
- Transcription and translation

Thank you!

Email us at

uofr.igem@gmail.com

Sources

“Animal Genetics.” *Print Page*, web2.mendelu.cz/af_291_projekty2/vseo/print.php?page=307&typ=html.

“DNA Structure - Overview & Diagrams.” *Expii*, www.expii.com/t/dna-structure-overview-diagrams-10209.

“Nucleotides and Bases.” *Genetics Generation*, knowgenetics.org/nucleotides-and-bases/.

“Overview of Translation (Article).” *Khan Academy* Khan Academy, www.khanacademy.org/science/biology/gene-expression-central-dogma/translation-polypeptides/a/translation-overview.

“Transcription: an Overview of DNA Transcription (Article).” *Khan Academy* Khan Academy, www.khanacademy.org/science/biology/gene-expression-central-dogma/transcription-of-dna-into-rna/a/overview-of-transcription.

“What Is the Relationship between DNA, Genes and Chromosomes?” *Quora*, www.quora.com/What-is-the-relationship-between-DNA-genes-and-chromosomes.