



Introduction to Molecular Biology

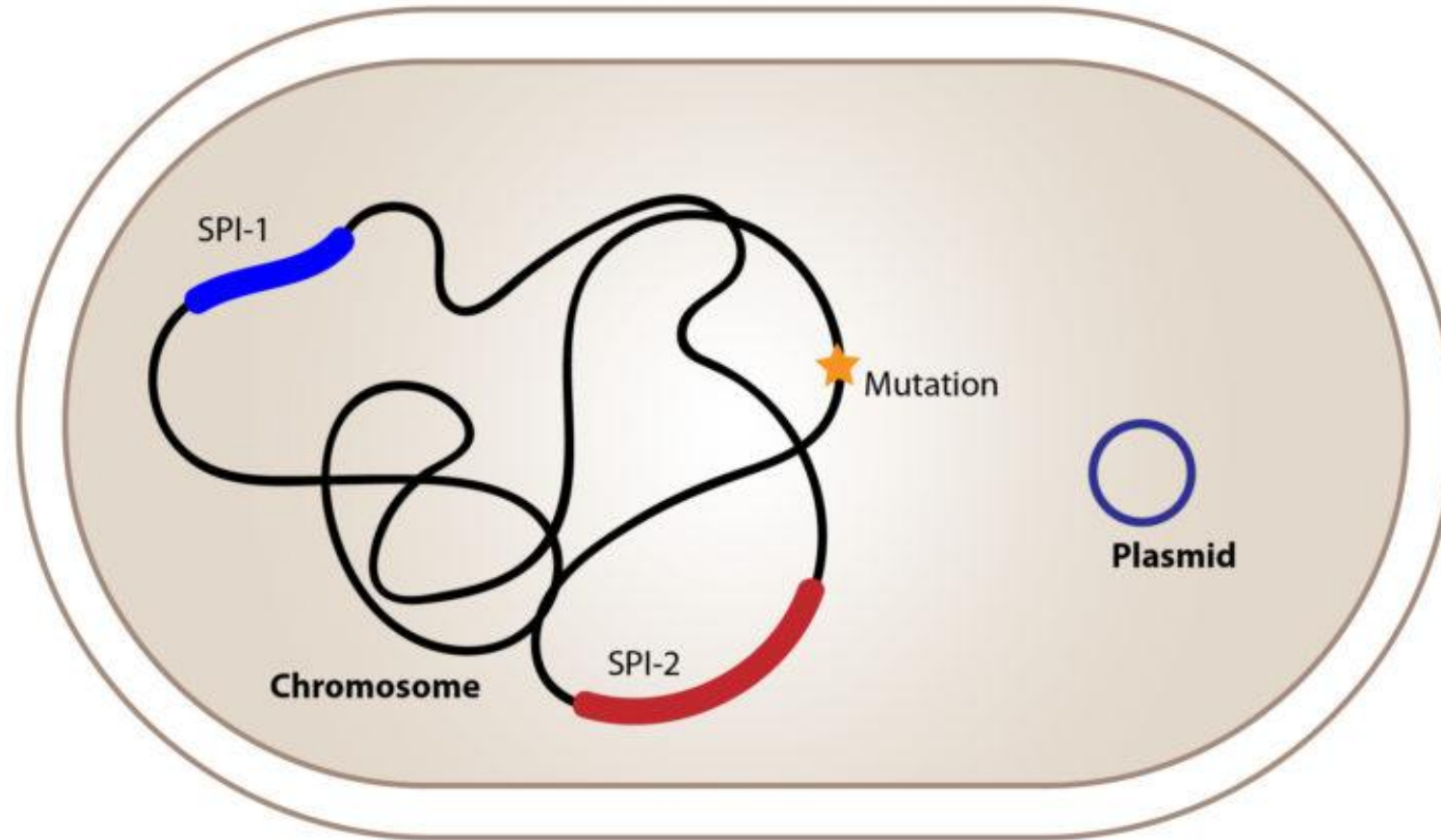
Phuc Loi Luu, PhD

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Zalo: 0901802182

Jan 25 2025

Prokaryotes from Genome to Proteins



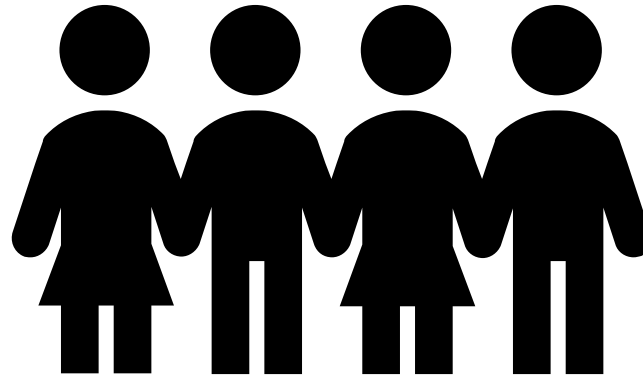
Content

- **Class member introduction**
- **Curriculum of Introduction to Molecular Biology**
- **Projects and important dates**
- **Evaluation for the course**
- **How Introduction to Molecular Biology lecture work?**

Class member introduction

Bạn phở
không?

Phở! Cảm
ơn bạn.
Còn bạn?



PHUC-LOI LUU, PhD



Head of Scientific Research Office

Current Affiliation

Institute for Applied Research in Health Sciences and Aging
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Education and Research Interest

EDUCATION AND PROFESSION

| | | | |
|-------------|--|---|---------------------------|
| 2023 – 2024 | Tam Anh Research Institute (TAMRI) | <i>Head of Data Science Division</i> | Ho Chi Minh City, Vietnam |
| 2022 – 2023 | Zymo Research | <i>Bioinformatic Group Leader</i> | Ho Chi Minh City, Vietnam |
| 2014 – 2022 | Garvan Institute of Medical Research, UNSW Sydney | <i>Bioinformatics researcher in Computational Cancer Genomics and Epigenomics under the supervision of Prof. Susan Clark</i> <i>Conjoint Senior Lecturer</i> | Sydney, Australia |
| 2011 - 2014 | Max Planck Institute for Molecular Biomedicine, University of Muenster | <i>PhD student in stem cell computational biology under the supervision of Prof. Hans R. Schöler</i> | Muenster, Germany |
| 2010 – 2011 | KIST–Europe | <i>Data Scientist</i> | Saarbruecken, Germany |
| 2008 – 2010 | Max Planck Institute for Informatics, University of Saarland | <i>Bioinformatics Post-graduate student under the supervision of Prof. Thomas Langauer</i> | Saarbruecken, Germany |
| 2005 – 2008 | Nong Lam University - Ho Chi Minh City | <i>Lecturer</i> | Ho Chi Minh City, Vietnam |
| 2000 – 2005 | University of Science - Ho Chi Minh City National University | <i>Bioinformatics undergraduate student under the supervision of Prof. Ho Huynh Thuy Duong</i> | Ho Chi Minh City, Vietnam |

Undergraduate at University of Science - Ho Chi Minh City National University (2000 – 2005)

- Major: Bioinformatics
- Research Topics:
 - Genotyping HCV, HBV, HPV
 - Anti-biotics resistance in bacteria

PENICILLIN BINDING PROTEINS (PBPs) IN *STREPTOCOCCUS PNEUMONIAE*: DATABASE SETTING UP AND APPLICATION

Luu Phuc Loi, Thai Ke Quan, Nguyen Hoang Chuong, Thai Thien Minh, Ho Huynh Thuy Duong

Department Genetics, Faculty of Biology, University of Natural Sciences, Viet Nam National University - Ho Chi Minh City

ABSTRACT

β -Lactam antibiotics inhibit the growth of *Streptococcus pneumoniae* by inactivation of cell-wall-synthesizing enzymes, the penicillin-binding proteins (PBPs). Resistance to β -lactam antibiotics of *S. pneumoniae* is essentially due to altered PBPs with decreased affinities to the antibiotic. We investigated relationship between point mutations on pbp genes – pbp1a, 2b, 2x - and penicillin resistance in *S. pneumoniae* clinical isolates. With sequences determined from local isolates combining to data retrieved from GenBank, we established a database named PGD (Penicillin Binding Protein Gene Database) which integrated information about nucleotide sequence and point mutations of 472 strains. Using the set up database, we applied a PCR-based protocol to detect penicillin resistant *S. pneumoniae* strains. The protocol detects 18/20 resistant strains and needs further improvement.

Hepatitis C virus isolate MB14 5' UTR

GenBank: AY690659.1

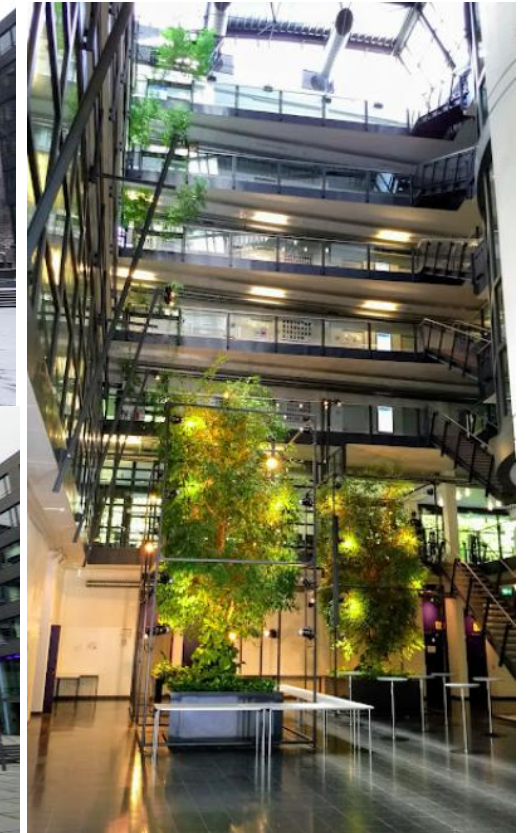
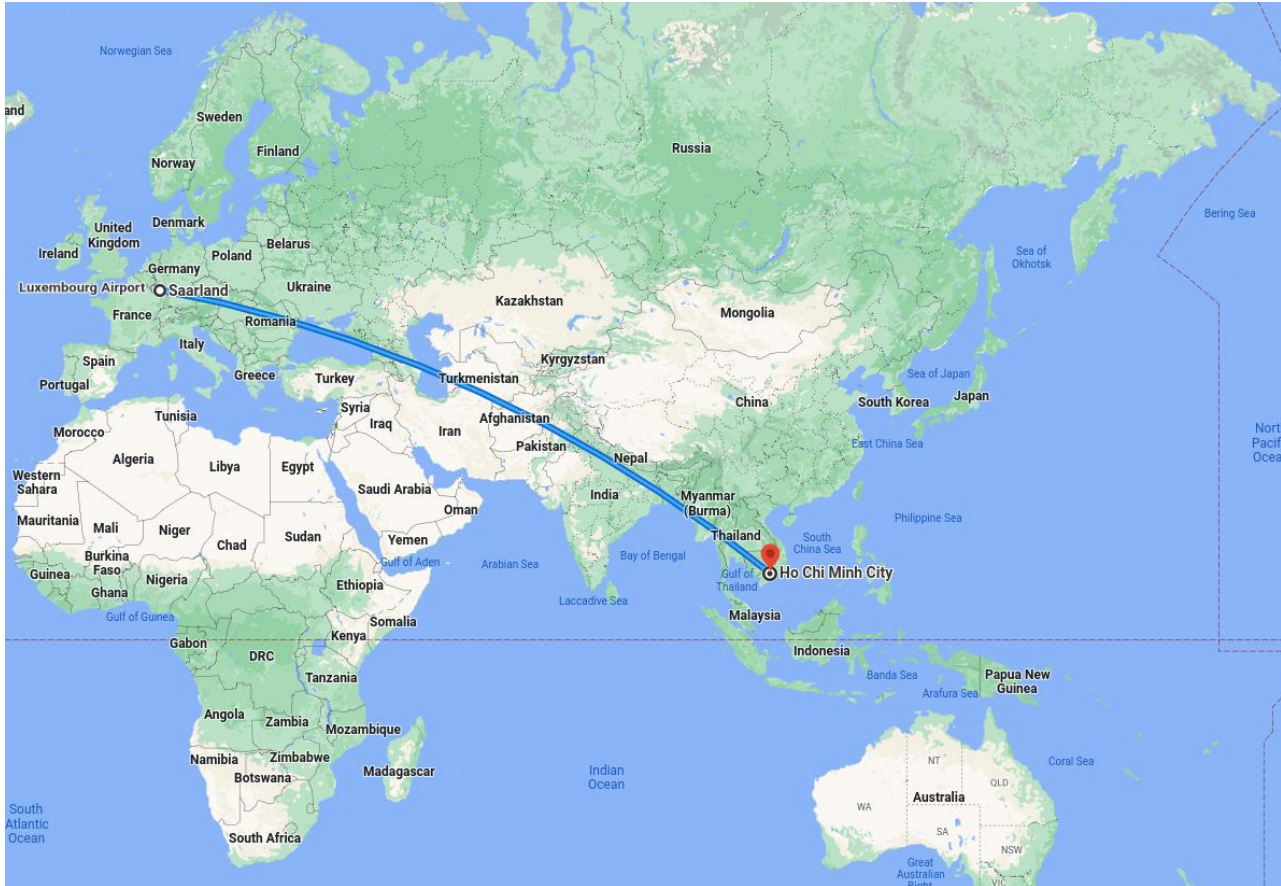
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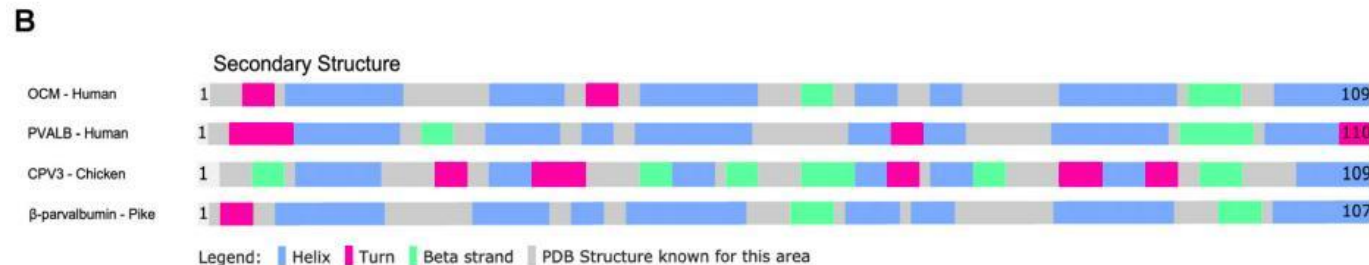
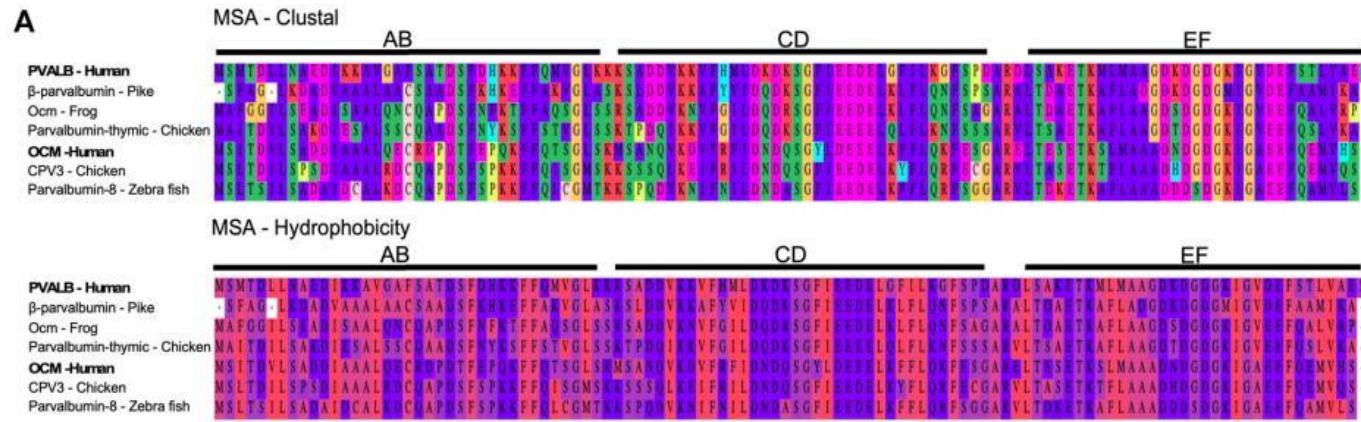
| | | | | | |
|------------|---|-------|-----|--------|-----------------|
| LOCUS | AY690659 | 94 bp | RNA | linear | VRL 22-AUG-2004 |
| DEFINITION | Hepatitis C virus isolate MB14 5' UTR. | | | | |
| ACCESSION | AY690659 | | | | |
| VERSION | AY690659.1 | | | | |
| KEYWORDS | . | | | | |
| SOURCE | Hepacivirus C | | | | |
| ORGANISM | Hepacivirus C Viruses; Riboviria; Orthornavirae; Kitrinoviricota; Flasuviricetes; Amarillovirales; Flaviviridae; Hepacivirus. | | | | |
| REFERENCE | 1 (bases 1 to 94) | | | | |
| AUTHORS | Nguyen,H.C., Ho,T.T.T., Luu,P.L. and Ho,H.T.D. | | | | |
| TITLE | Genotyping of Hepatitis C virus by real-time RT-PCR | | | | |
| JOURNAL | Unpublished | | | | |
| REFERENCE | 2 (bases 1 to 94) | | | | |
| AUTHORS | Nguyen,H.C., Ho,T.T.T., Luu,P.L. and Ho,H.T.D. | | | | |
| TITLE | Direct Submission | | | | |
| JOURNAL | Submitted (20-JUL-2004) Genetics, University of Natural Sciences Viet Nam National University - Ho Chi Minh City, 227 Nguyen Van Cu Street Dist. 5, Ho Chi Minh City 0848, Viet Nam | | | | |
| FEATURES | Location/Qualifiers | | | | |
| source | 1..94 /organism="Hepacivirus C" /mol_type="genomic RNA" /isolate="MB14" /db_xref="taxon:11103" /country="Viet Nam" <1..>94 | | | | |
| ORIGIN | 5'UTR 1 ctcgcttcct ggagctgcc ggatccgagg atgatttcac gtgcgatgag ctgcctgacg 61 gccaggaacg accgggtcct ttcttgatc accc // | | | | |

The American journal of tropical medicine and hygiene 73(6):55-55 (2005).

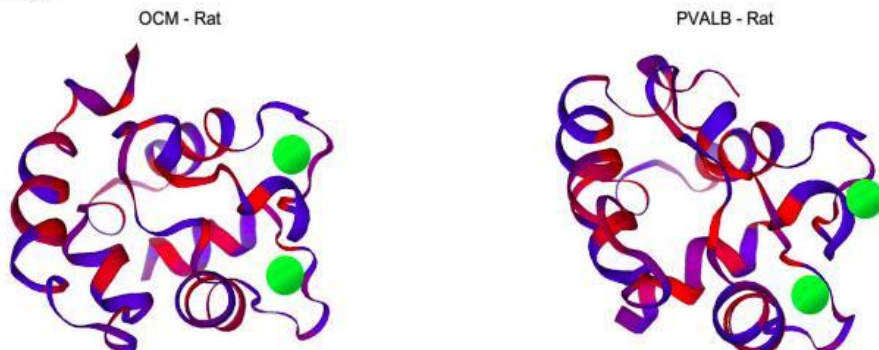
Master degree in **Bioinformatics** at **Max Planck Institute for Informatics** University of Saarland in Germany (2007 - 2010)



Identifying functional discriminative motifs in protein families



Tertiary Structure



- Protein structures and functions
- Bigdata mining and Machine Learning



PhD at Max Planck Institute for Molecular Biomedicine and University of Muenster in Germany (2011 - 2014)



PhD in Bioinformatics and iPS technology

- Research:
 - The dynamics of stem cell and induced pluripotent stem cell (iPS) epigenomes using genome-wide Next Generation Sequencing (NGS)
 - Somatic memory in iPS technology
 - Bioinformatics pipeline development

CSH PRESS GENOME RESEARCH

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Disclosing the crosstalk among DNA methylation, transcription factors, and histone marks in human pluripotent cells through discovery of DNA methylation motifs

Phuc-Loi Luu¹, Hans R. Schöler^{2,3} and Marcos J. Araúzo-Bravo^{1,4}

Author Affiliations

¹Computational Biology and Bioinformatics Group, Max Planck Institute for Molecular Biomedicine, 48149 Münster, Germany;

²Department of Cell and Developmental Biology, Max Planck Institute for Molecular Biomedicine, 48149 Münster, Germany;

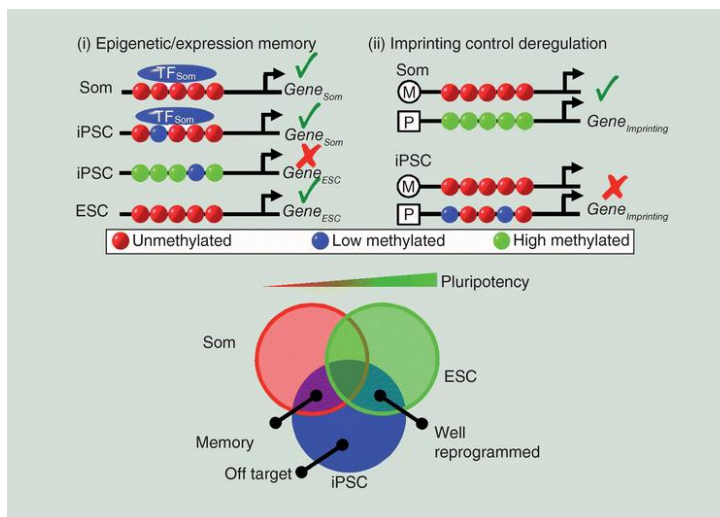
³University of Münster, Medical Faculty, 48149 Münster, Germany

EPIGENOMICS, VOL. 10, NO. 2 | RESEARCH ARTICLE

Rules governing the mechanism of epigenetic reprogramming memory

Phuc-Loi Luu[†], Daniela Gerovska[†], Hans R Schöler & Marcos J Araúzo-Bravo

Published Online: 16 Jan 2018 | <https://doi.org/10.2217/epi-2017-0098>



P3BSseq: parallel processing pipeline software for automatic analysis of bisulfite sequencing data

Phuc-Loi Luu, Daniela Gerovska, Mikel Arrospeide-Elgarresta, Sugoi Retegi-Carrión, Hans R Schöler, Marcos J Araúzo-Bravo

Bioinformatics, Volume 33, Issue 3, 1 February 2017, Pages 428–431, <https://doi.org/10.1093/bioinformatics/btw633>

Published: 06 October 2016 Article history

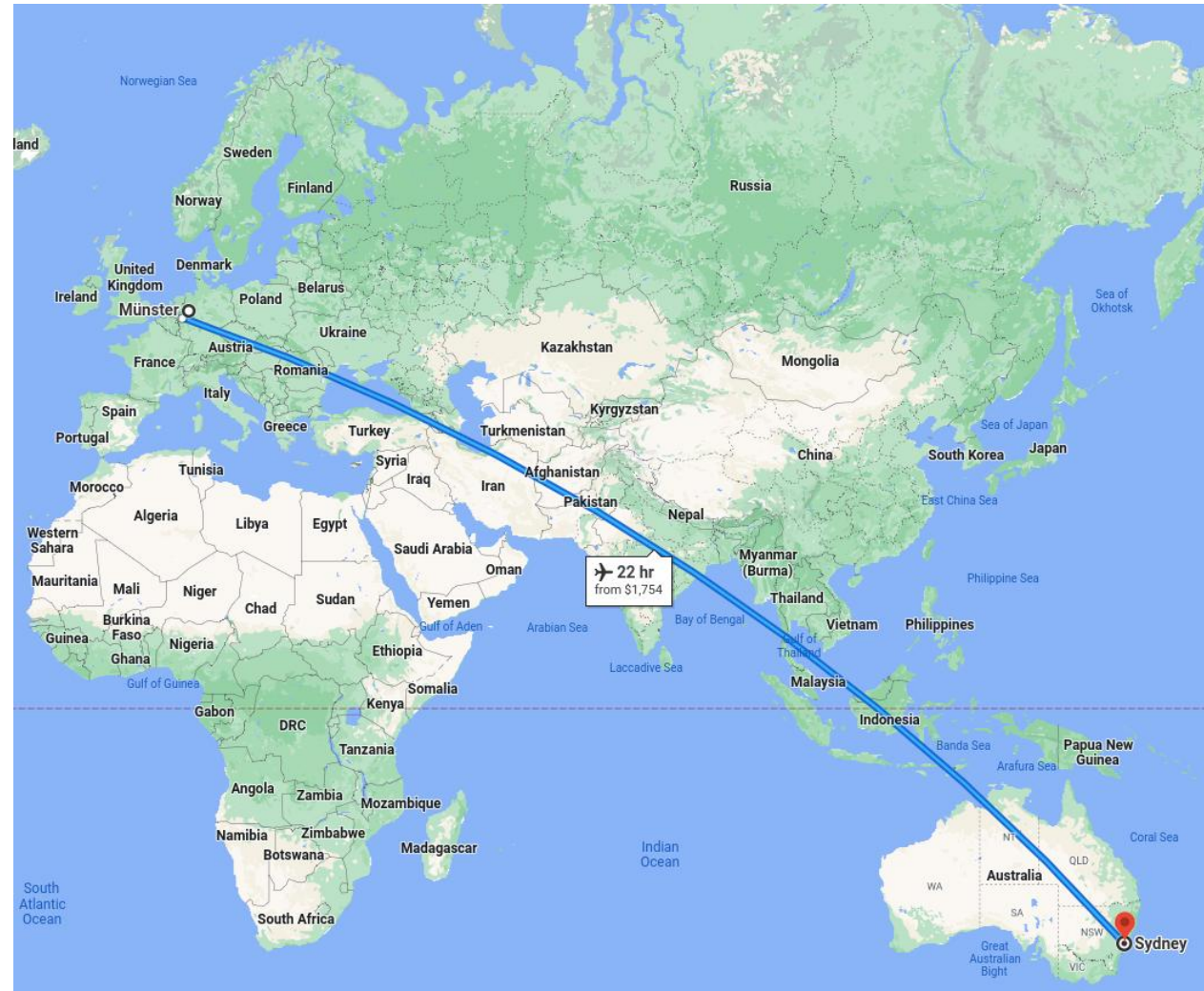
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Abstract

Motivation

Bisulfite sequencing (BSseq) processing is among the most cumbersome next generation sequencing (NGS) applications. Though some BSseq processing tools are available, they are scattered, require puzzling parameters and are running-time and memory-usage demanding.

Seven years of research at Garvan Institute of Medical Research in Australia (2014 - 2022)



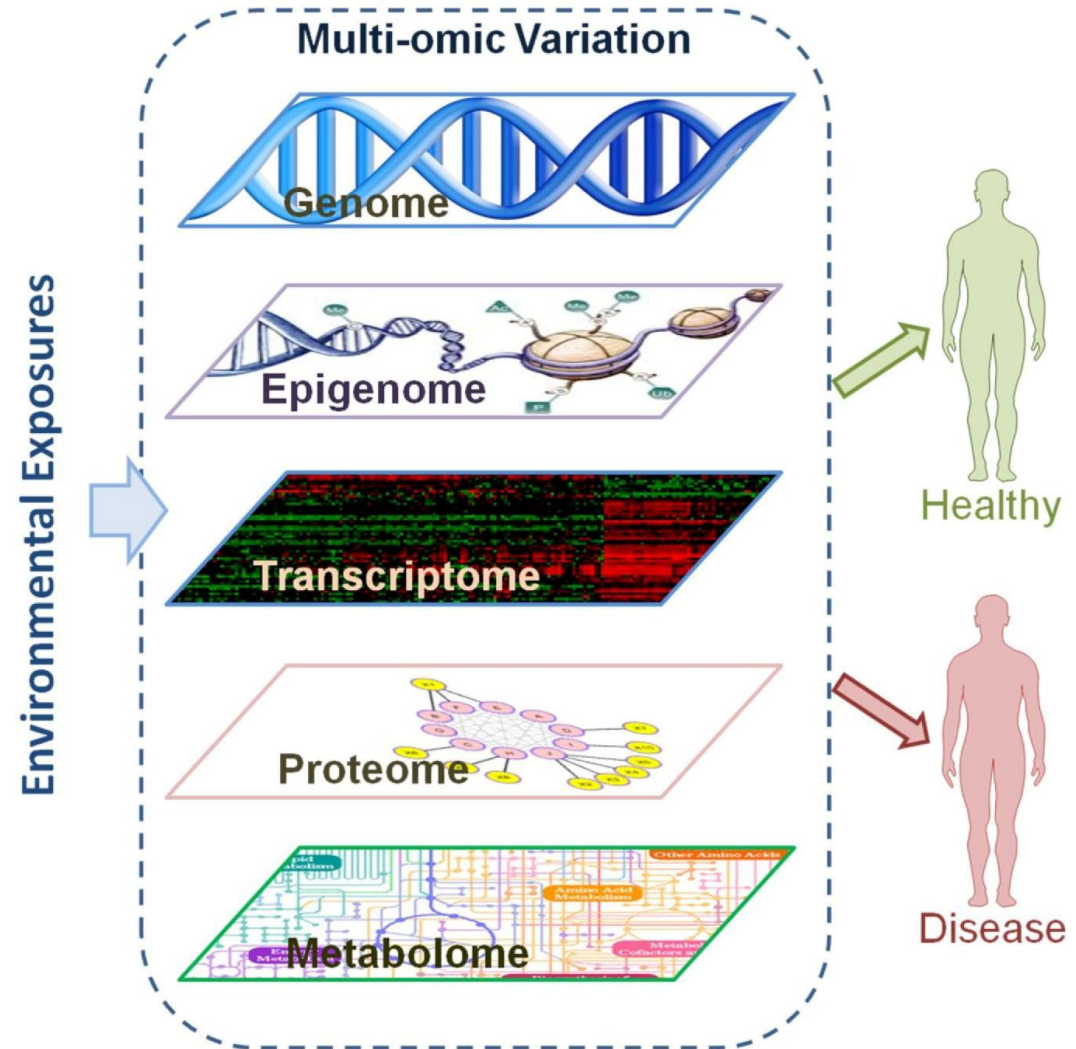
Seven years of research at Garvan Institute of Medical Research in Australia (2014-2022)

- Major: Bioinformatics and Machine Learning
- Research:
 - Cancer Genomics and Epigenomics
 - Single cell and Spatial transcriptomics technology and other diagnosis methods
 - Bioinformatics pipeline development

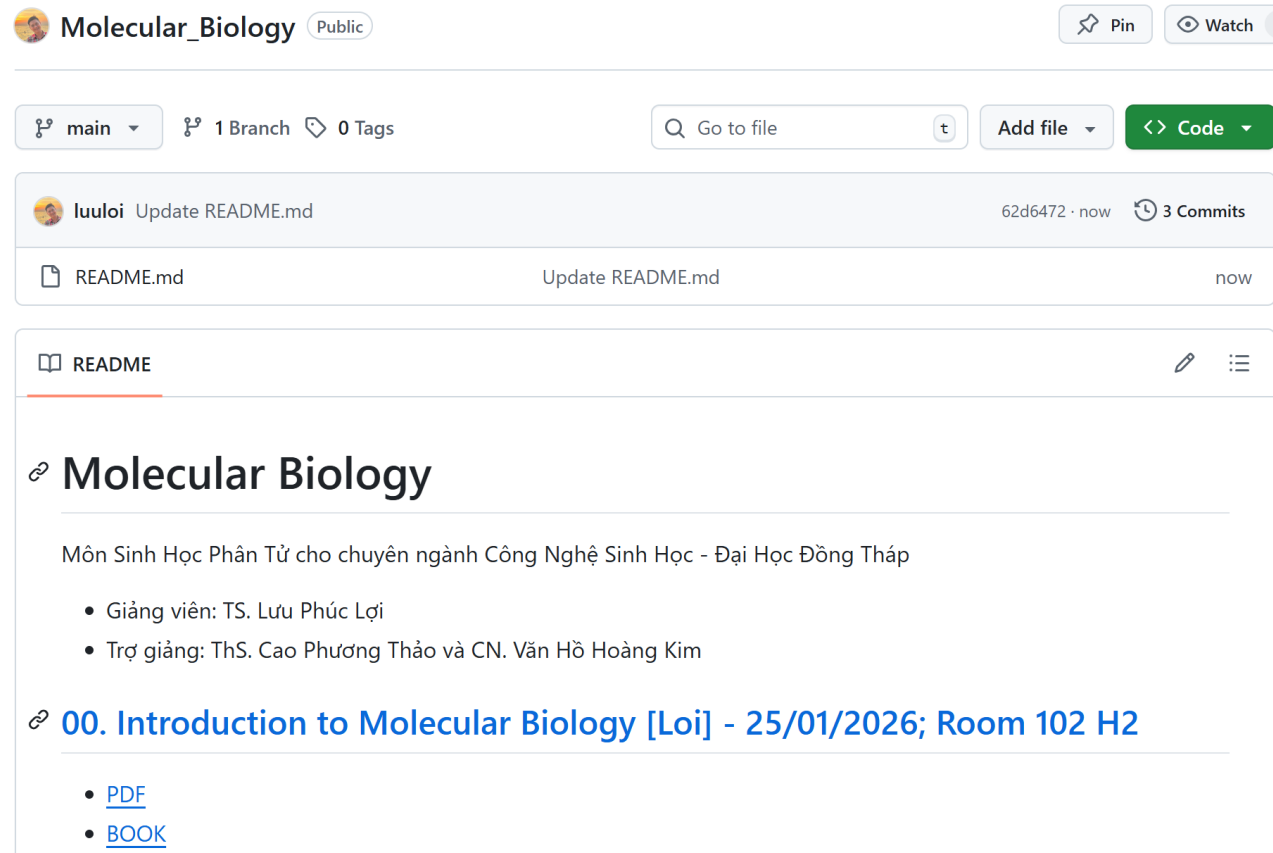


More than one year at Zymo Research (Sep 2022-Nov 2023)

- Microbiomics
- Epigenomics
- Transcriptomics
- Proteomics
- Metabolomics
- Bioinformatics



Curriculum of Introduction to Molecular Biology



The screenshot shows a GitHub repository named 'Molecular_Biology' by user 'luuloi'. The repository is public and has 1 branch and 0 tags. The main branch is selected. The repository contains a single file, 'README.md', which was updated by 'luuloi' at 62d6472. The README content is as follows:

Molecular Biology

Môn Sinh Học Phân Tử cho chuyên ngành Công Nghệ Sinh Học - Đại Học Đồng Tháp

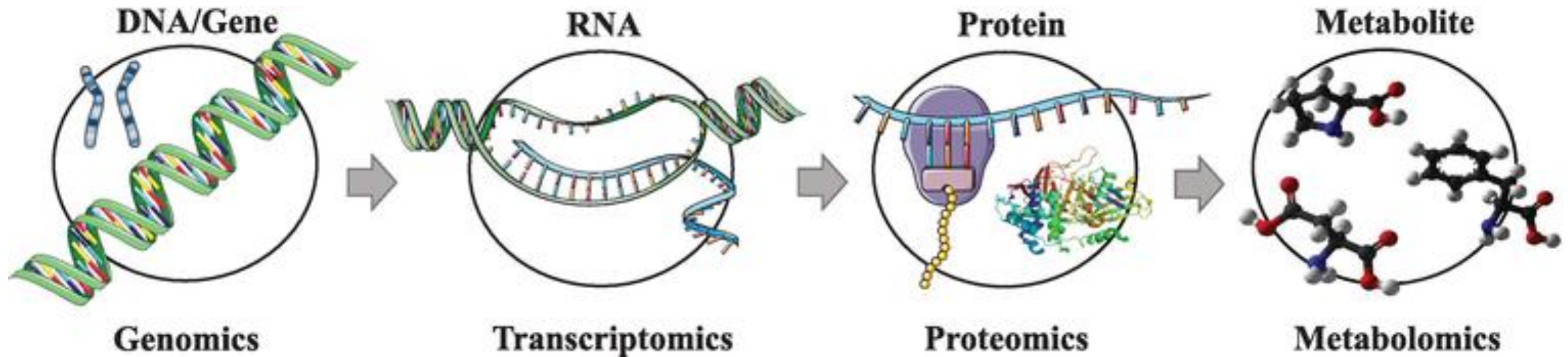
- Giảng viên: TS. Lưu Phúc Lợi
- Trợ giảng: ThS. Cao Phương Thảo và CN. Văn Hồ Hoàng Kim

00. Introduction to Molecular Biology [Loi] - 25/01/2026; Room 102 H2

- [PDF](#)
- [BOOK](#)

https://github.com/luuloi/Molecular_Biology/

Central Dogma: Gene Mutation and Diseases



PAH gene

Ref ...ATCGAT...
P1 ...ACGAT...

NM_000277.3(PAH):c.971T>A

PAH mRNA

Ref ...AUCGAU...
P1 ...ACGAU...

NM_000277.3(PAH):c.971T>A

PAH protein

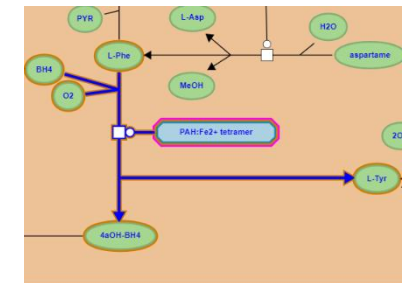
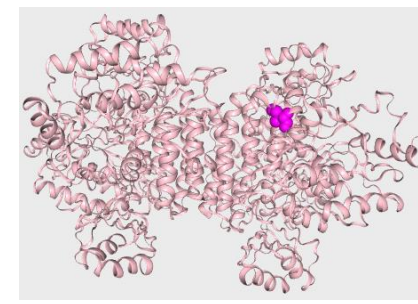
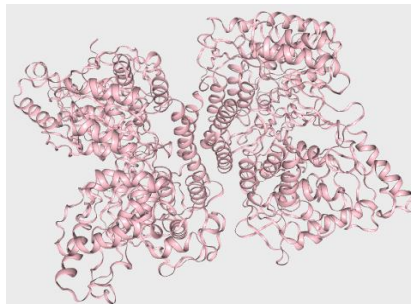
Ref ...Ile-Asp...
P1 ...Asn-Asp...

NM_000277.3(PAH):p.Ile324Asn

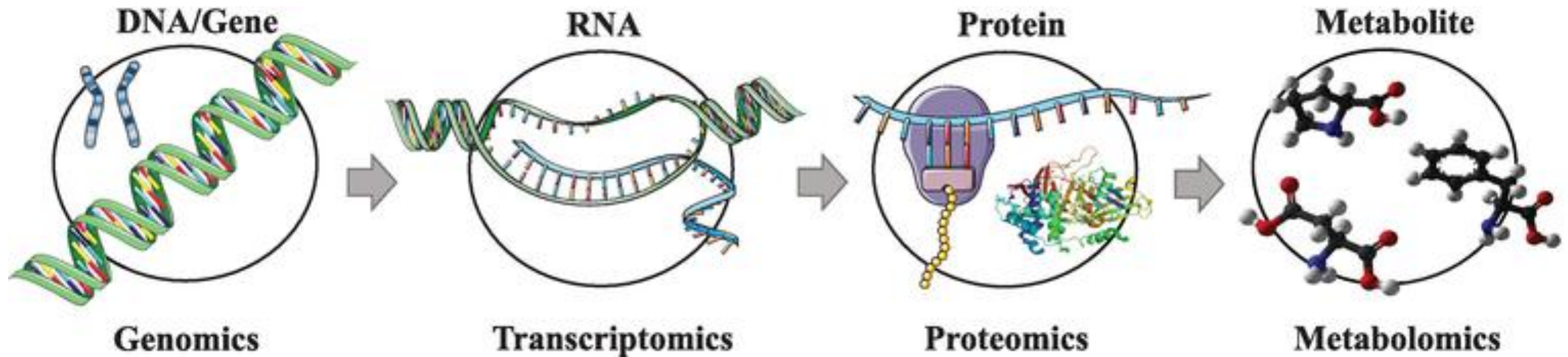
PAH

Ref Phe → Tyr

PAH
P1 Phe ~~→~~ Tyr



Content of Introduction to Molecular Biology

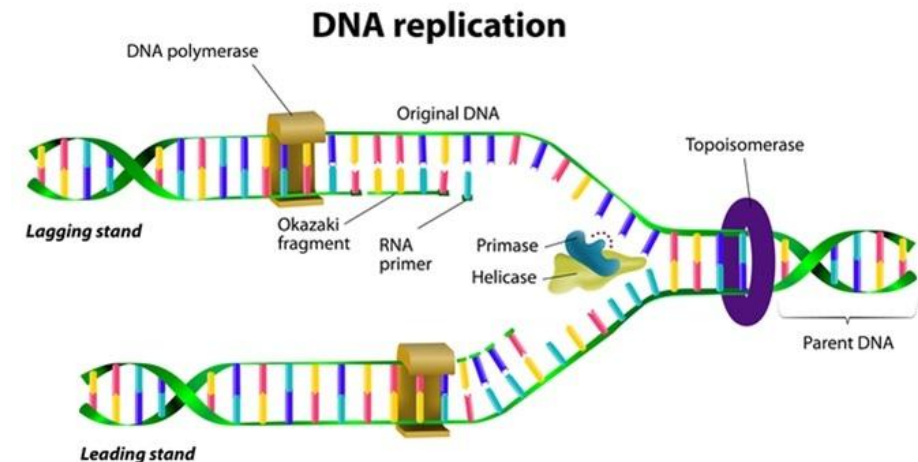


Part 1: DNA Replication and Repair

Part 2: Transcription and Transposition

Part 3: RNA Processing and Translation

Part 4: Molecular Techniques



Projects for Mid-Term and important dates

| No | Project | Aim | Requirement | Group |
|----|---------|-----|-------------|-------|
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |
| 6 | | | | |

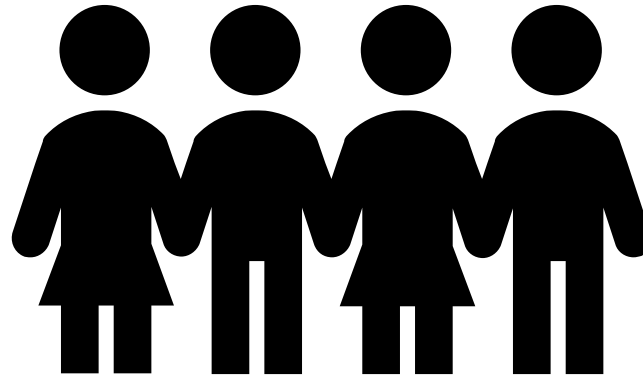
Evaluation for the course

- Presentation date (Mid-term exam): ?
- Max 3 min each group (3 students)
- 1 to 2 questions each student
- Mid-term score = Report (50%) + Presentation (40%) + Slide (10%)
- Final exam:?
- Final exam score = Quizzes (40%) + Final Test (60%)

No attendance checking

Nghỉ học
được không
bạn?

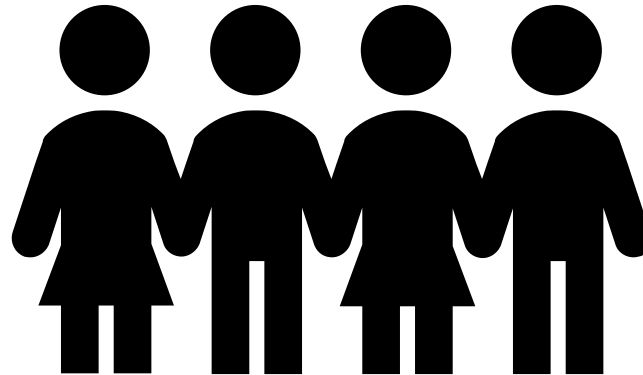
Được nhé!



No attendance checking

Nghỉ học
được không
bạn?

Nhưng khó
đậu nhe!



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Kênh chia sẻ kiến thức Giải Phẫu bệnh hiện đại, Tin sinh học và Khoa học Y sinh. Bao gồm các bài giảng về:

- Chuyên ngành Giải Phẫu bệnh cơ bản, chuyên sâu
- Các chuyên ngành y khoa và Khoa học Y sinh khác
- Kỹ thuật labo (giải phẫu bệnh, sinh học tế bào và phân tử)
- Xử lý và phân tích dữ liệu giải trình tự thông lượng cao (DNA-seq, RNA-seq, ATAC-seq, etc.)
- Khoa học dữ liệu khác: Data Visualization, Machine Learning
- Điểm báo (journal club): đọc và review các bài báo khoa học y sinh

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Data Visualization 2022 40 videos

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Thank you for your attention!

