



**Division of Physical Sciences and Mathematics, U.P. Visayas  
Miag-ao, Iloilo**



**CMSC 197  
SS 2018-2019 (MTh 08:00 - 9:30 AM)**

**Syllabus Prepared By:  
Ms. Almie Carajay**

**UP Vision**

The University of the Philippines envisions to become a great university, taking the leadership role in the development of a globally competitive Philippines.

**UP Mission**

The University of the Philippines aims to provide academic excellence and operational excellence; strong research and creative capability, supported by an expanded graduate program and geared to addressing the country's problems; excellent faculty and staff working in an environment conducive to outstanding performance and high productivity; high visibility and effective public service; modernized physical facilities and technological infrastructure for teaching, research and administration; maintain financial sustainability achieved by resource generation and administrative efficiency, while preserving its public character; gain strong support from the alumni and other stakeholders; and produce the best and brightest students across the country prepared for successful careers and responsive citizenship.

**UPV Vision**

A world class university at the forefront of Fisheries and Aquatic Sciences education, research and development

**UPV Mission**

- Provide relevant quality education in fisheries and aquatic sciences;
- Promote, preserve and nurture the Visayan cultural heritage;
- Develop competitive and innovative management practices and technologies in education, research and public service; and
- Lead in and advocate for the sustainable development of the Visayas Region and of the nation within the changing world order

## **Core Values**

Service, Excellence, Integrity, Nationalism, Environmental Stewardship

## **Vision of the CAS**

A premier institution of liberal arts and science education sensitive and responsive to the needs of changing times locally and internationally.

## **Mission of CAS**

Through programs in the liberal arts and sciences, the College of Arts and Sciences seeks to:

1. Nurture the intellectual and creative capabilities of empowered individuals and groups for responsible citizenship through an understanding and appreciation of socio-cultural traditions.
2. Be a dynamic college that inculcates in the students:
  - a. Basic knowledge in the natural and social sciences and the humanities
  - b. Skills necessary to communicate and to analyze and integrate knowledge
  - c. Ability to learn independently and think critically; and,
  - d. A strong sense of nationalism.
3. Engage in research and public service activities that project commitments to the value of heritage, democratic expression, scientific progress, and community development.

## **Core Values of the CAS**

Excellence, Integrity, Gender-fairness, Harmony with nature, Professionalism, Nationalism

## **Instructor**

Ms. Almie Carajay of Computer Science, UP Visayas, Miagao

Email Ad: [apcarajay@up.edu.ph](mailto:apcarajay@up.edu.ph)

My consultation hours:

<b>M</b>	<b>T</b>	<b>W</b>	<b>Th</b>	<b>F</b>
1 – 3 PM	3 – 5 PM		1 – 3 PM	3 – 5 PM

**Course Number:** CMSC 197  
**Course Title:** Special Topics (Introduction to Bioinformatics)  
**Course Description:** This course covers computational techniques for mining the large amount of information produced by recent advances in biology, such as genome sequencing and microarray technologies.  
**Prerequisites:** None  
**Course credit:** 3.0  
**Number of Hours:** 36 hours (3 hours/week)  
**Course Goal:** The main objective of the course is to provide the student with a solid foundation for conducting further research in bioinformatics. By the end of the course, the students will have learned:

- the bioinformatics terminology,
- main bioinformatics problems,
- and the key methods and tools used in bioinformatics.

**Course Outline:**

1. Introduction (1 week)
  - a. Biological Foundations
    - i. DNA, RNA, and the Genome
    - ii. Central Dogma of Molecular Biology
    - iii. Molecular Evolution
2. Sequence analysis (4 weeks)
  - a. Analyze DNA and protein sequences for clues regarding function
  - b. Identification of homologues
  - c. Pairwise sequence alignment
  - d. Statistical significance of sequence alignments
  - e. Sequence Motifs
  - f. Suffix trees
  - g. Multiple sequence alignment
3. Phylogenetic trees, clustering methods (1 week)
4. Protein structures (4 weeks)
  - a. Analyze protein structures for clues regarding function
  - b. Structure alignment
  - c. Structure prediction (secondary, tertiary)
  - d. Structural motifs, active sites, docking
  - e. Multiple structural alignment, geometric hashing
5. Microarray data analysis (2 weeks)
  - a. Correlations, clustering
  - b. Inference of function
6. Gene/Protein networks, pathways (2 weeks)
  - a. Protein-protein, protein/DNA interactions
  - b. Construction and analysis of large-scale network

### Course Requirements:

- i. Midterm Exam (30%)
- ii. Assignments/Quizzes (20%)
- iii. Problem Sets (50%)

Passing Percentage: 60%

Failure to complete requirements = INC

No grade of 1.0 will be given if an absence (excused or unexcused) is incurred

96 – 100	1.0
91 – 95	1.25
86 – 90	1.5
81 – 85	1.75
75 – 80	2.0
71 – 80	2.25
68 – 70	2.5
63 – 67	2.75
60 – 62	3.0
50 – 59	4.0
49 and below	5.0

### Class Policies:

1. A student caught cheating during examinations/quizzes will automatically be given a of 5.0 and the case will be forwarded to the Student Disciplinary Tribunal.
2. During examinations, a student is ONLY allowed to bring a pen unless specified otherwise. No gadgets and listening to music with earphones allowed.
3. During discussions, the use of laptops and other gadgets is not allowed unless used to supplement instruction.
4. Students are not allowed to bring food and drinks within the rooms.
5. A student who acquires at most 6 absences will be given a grade of DRP/5.0 depending on his/her current standing.
6. **Consultation.** Due to other commitments apart from teaching and to ensure proper queueing of multiple requests for consultations, students who wish to schedule a consultation must first send an e-mail to the e-mail address mentioned in the first part of the syllabus setting an appointment at least 24 hours before the requested date and time of consultation. Note however that a rescheduling of the consultation may be done subject to the availability of instructor.

7. **Deliverables.** Submission of deliverables should be done on or before the designated deadlines (to be announced in future sessions). Late submissions would incur a 20% deduction per day late, and can incur a maximum of 100% deduction. Note though that even if a deliverable will no longer merit any points, it is considered a requirement, and non-submission of the deliverable on or before the deadline of submission of grades would mean a grade of INC.

## References:

- Textbook:
  - M. Zvelebil and J. O. Baum, *Understanding Bioinformatics*, Garland Science, 2008.
- Reference Books:
  - D.E. Krane and M.L. Raymer, *Fundamental Concepts of Bioinformatics*, Pearson Education, 2003.
  - N. C. Jones and P. A. Pevzner, *An Introduction to Bioinformatics Algorithms*, MIT press, 2004.
  - C.A. Orengo, D.T. Jones and J.M.Thornton, *Bioinformatics: Genes, Proteins and Computers*, Routledge, 2003.
  - A. M. Lesk, *Introduction to Bioinformatics*, Oxford University Press, 2002.
  - D. Mount, *Bioinformatics: Sequence and genome analysis*, Cold Spring Harbor Laboratory Press, 2001.
  - P. A. Pevzner, *Computational Molecular Biology: An Algorithmic Approach*, MIT press, 2000.
  - P. Baldi and S. Brunak, *Bioinformatics: the machine learning approach (2nd edition)*, MIT press, 2001.
  - T. Jiang, Y. Xu, and M. Zhang, eds. *Current Topics in Computational Molecular Biology*, MIT press, 2002.
  - S. Karlin, *Frontiers of Bioinformatics: Unsolved Problems and Challenges*, National Academy Press, 2005