

Department of Electrical and Computer Engineering
University of Puerto Rico
Mayagüez Campus

BING 6004 – Principles of Computational Bioengineering Syllabus – Spring 2016

1. Faculty & Staff

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Office Hours: TBA

2. Course Description

This course introduces the basic computational issues and methods employed in molecular biology. Biological data sources available on the Internet will be utilized and analyzed.

3. Pre-requisites

None

4. Lectures

Tuesdays/Thursdays 6:30 AM – 7:45 PM, S-207

5. Course Credits

3 credits

6. Course Web Site and Moodle

The course will have a website holding many useful resources to help your throughout the course. We try to make an effort to keep the site updated, but will invariably make mistakes and forget to update materials once in a while. PLEASE LET US KNOW ABOUT ANY PROBLEMS WITH THE WEBSITE AS SOON AS YOU DETECT THEM. We tend to get a fair amount of general criticism for not keeping the site up to date, but we seldom get an email notifying a broken or stale link. HELP US HELP YOU.

<http://www.ece.uprm.edu/~bvelez>

Course grades and assignments will be handled using the Moodle course management system available at:

<http://ecourses.uprm.edu>

7. Textbook & References

The following is a list of reference books in which some of the material discussed in class can be found:

	<p>Practical Computing for Biologists (1st Edition) by Steven Haddock and Casey Dunn Publisher: Sinauer Associates, Inc.; First edition (November 5, 2010) ISBN-10: 0878933913 ISBN-13: 978-0878933914</p>
	<p>Think Python: How to Think Like a Computer Scientist 2nd Edition by Allen B. Downey Publisher: O'Reilly Media Inc. (2015) ISBN-13: 978-1491939369 ISBN-10: 1491939362</p>
	<p>Essential Bioinformatics (1st Edition) by Jin Xiong Publisher: Cambridge University Press; 1 edition (March 13, 2006) ISBN-10: 0521600820 ISBN-13: 978-0521600828</p>
	<p>Introduction to Bioinformatics (4th Edition) by Arthur Lesk Publisher: Oxford University Press; 4 edition (January 1, 2014) ISBN-10: 0199651566 ISBN-13: 978-0199651566</p>

An additional set of programming language references, manuals supplementary materials will be posted on the course website.

8. Email

Every student is required to have an email account accessible from the Internet. Email will be an essential means of communication between students and staff during the term. Students and staff will be assumed to have received email within 24 working hours, not including

weekends. Students are responsible for properly maintaining their email accounts so as to avoid email from bouncing.

9. Office Hours

The professor will hold weekly office hours. This is an excellent opportunity to go over the material discussed in class on a one on one basis. Unfortunately, many students who may greatly benefit from it seldom visit the professor or the TA before their doubts have accumulated to the point where it becomes very hard to keep up with the course. We commonly get student complains near the end of the semester about the difficulty of some concepts and their inability to keep up with the course. Such complaints seldom come from students who have frequently attended office hours. If you do not understand a concept discussed in class please use this important resource. Bring your questions and remember that the dumbest question is the one that is never asked. IT IS OUR JOB AND GOAL TO HELP YOU MASTER THE COURSE SUBJECTS.

10. Course Evaluation

Your grade will be based **exclusively** on the scores that you obtain in the class programming assignments, partial exams, final exam and class participation. The weights assigned to each of these categories are as follows:

Evaluation Categories	Percentage Weight
Homework/Programming Assignments	50%
Partial Exam	20%
Class Participation & Attendance	10%
Final Exam	20%

Your total score will be calculated as a weighted average of your average scores in each category. Each individual programming assignment and exam will carry the same weight within its corresponding category. Your grade will be determined by a standard curve as follows:

Grade	Points Interval
A	[90, 100]
B	[80, 90)
C	[70, 80)
D or F	[0, 70)

VERY IMPORTANT!

In order to pass the course you must turn in all your programming assignments and attend all exams.

Students are expected to provide the best possible solution to programming assignment and exam problems in order to get full credit. We will not only evaluate **correctness**; we will evaluate **quality** as well.

11. Programming Assignments

This core of the course will be the compiler project, which will be divided in various programming assignment phases. Each programming assignment will carry a relative weight corresponding to the level of effort and difficulty involved. Although we encourage student collaboration **it is a requirement of this course that students work on each programming assignment individually.**

You may turn in a programming assignment late, but you must always submit your programming assignments to pass the class even if it accumulates no points towards your total score. A percentage of the score will be deducted for your score for late submissions as follows:

Days Late	Percent Deduction
1 day late	25%
2 days late	50%
3 days late	100%

As for exams, programming assignments will be graded for both correctness and quality according to the following weights:

Criteria	Weight (%)
Correctness	60%
Design	20%
Efficiency	10%
Style & Documentation	10%

All programming assignments will be submitted electronically. You will receive instructions for electronic submission of programming assignments with each programming assignment. In some programming assignment the staff may decide to conduct in person interviews in order to gain better understanding of work accomplished by students and provide faster feedback that could be incorporated in future assignments in the course.

12. Partial Exams

We will have one partial exam. The exam will cover material up to and including the material covered before the date of the exam. However, emphasis will be placed on the material discussed but not tested by previous exams.

The exams will be administered in the class period at dates and times to be announced during the first few weeks of the term, but never later than two weeks before the exam; this to allow for sufficient time for students to plan their studying. Once the dates of the exams are announced, **they will not be subject to change.** You are responsible for planning ahead of time. Having other exams the same day is no excuse for changing the dates.

Attending partial exams is a requirement of this course and missing an exam will be reason enough to fail the course, unless an arrangement can be worked out with the professor at least 24 working hours before the date of the exam. Students must work individually on all exams. More on this below under academic integrity.

13. Final Exam

A comprehensive final exam will be administered at the time and date determined by the UPRM Registrar.

14. Academic Integrity

El artículo 10 del Reglamento General de Estudiantes de la Universidad de Puerto Rico contiene 15 puntos que se consideran "infracciones de las normas esenciales al orden y a la convivencia universitaria y acarrear sanciones disciplinarias." He aquí uno de los puntos.

La obtención de notas o grados académicos valiéndose de falsas y fraudulentas simulaciones, o haciéndose pasar por otra persona, o mediante treta o engaño, o copiando total o parcialmente la labor académica de otro estudiante, o copiando total o parcialmente las respuestas de otro estudiante a las preguntas de un examen, o haciendo o consiguiendo que otro tome en su nombre cualquier prueba o examen oral o escrito.

Violaciones a estos puntos pueden conllevar algunas de las siguientes sanciones:

1. *Amonestación*
2. *Probatoria por un tiempo definido durante el cual otra violación de cualquier norma tendrá consecuencia de suspensión o separación*
3. *Suspensión de la Universidad por un tiempo definido. La violación de los términos de la suspensión conllevará un aumento del período de suspensión o la separación definitiva de la Universidad.*
4. *Separación definitiva de la Universidad.*

Obtener información del Internet no autorizada por el profesor será considerado una violación flagrante del estatuto anterior. El estudiante que viole este reglamento obtendrá F en la clase y su caso podrá ser llevado ante la junta de disciplina del Recinto. Evítese este mal rato, o aténgase a las consecuencias.

Esperamos no tener que lidiar con una situación como esta, pero estamos preparados para responder enérgicamente de ser necesario.

Tentative Outline	Contact Hours
Introduction to Bioinformatics and Computational Genomics	3
Essential Programming for Bioinformatics	9
Bioinformatics Data Management Using Relational Databases	4.5
Sequence Alignment: Dynamic Programming Algorithms	1.5
Multiple Sequence Alignment Algorithms & Tools	1.5
Sequence Alignment: Heuristic Algorithms (FASTA, BLAST)	1.5
Next Generation Sequencing and Genome Assembly	6
Genome Annotation Algorithms and Tools	1.5
Bioinformatics Data Management Using Relational Databases	4.5
Statistical Analysis Tools (R)	3
Analyzing Gene Expression Data: Microarrays Classification	3
Protein structure prediction: homology modeling and <i>ab initio</i>	3
Phylogenetics	3
Advanced Topics	4.5
Total hours: (equivalent to contact period)	45

Éxito!