Course name : Bioinformatics
Course code : KUI 7831
Course type : Elective
Credit : 3

COURSE COORDINATOR

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TEAM TEACHING

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PREREQUISITE

none

COURSE DESCRIPTION

This course is designed to introduce public health specialist to bioinformatics tools and analysis methods. Upon completion of the course, students should be more comfortable working with the vast amounts of biomedical and genomic data and online tools that will be relevant to their work in the coming decades.

This is a hands-on, project-oriented class. Most weeks will include classroom lecture and computer lab time. There will be several homework projects assigned throughout the term. Labs work is essential for students to develop the basic skills needed to complete the deeper and more open-ended project assignments. Additional time in the lab will be offered for students who want more help with the online portion of their work. Lab work may also be completed on students' own machines at any time.

LEARNING OBJECTIVES

The objective of the course is to:

1. Introduce the theoretical concept about bioinformatics and relationship with public health and medicine.
2. Introduce the tools, especially online tools for bioinformatics
3. Introduce the data analysis on bioinformatics fields and the relevance on public health surveillance

COURSE LEARNING OUTCOME

After the completion of the course, students should:

- Understand the theoretical concept about bioinformatics and relationship with public health and medicine.
- Understand the tools, especially online tools for bioinformatics
- Understand and able to perform data analysis on bioinformatics fields and the relevance on public health surveillance

STUDENTS EVALUATION

1. Quizzes	10%
2. attendance and participation at class	40%
3. Paper assignment (1)	15%
4. Presentation (2)	15%
5. Final exam	20%
Total	100%

Mark will be grade according to the following score:

Makr	Scale	Percentage
A	4.0	93% - 100%
A-	3.75	90% - 92%
B+	3.50	87% - 89%
B	3.25	83% - 86%
B-	3.00	80% - 82%
C+	2.75	77% - 79%
C	2.50	73% - 76%
C-	2.25	70% - 72%
D+	2.00	67% - 69%
D	2.75	63% - 66%
D-	2.50	60% - 62%
E	2.25	Kurang dari 60%

LEARNING PROCESS

This is a hands-on, project-oriented class. Most weeks will include classroom lecture and computer lab time. There will be several homework projects assigned throughout the term. Labs work is essential for students to develop the basic skills needed to complete the deeper and more open-ended project assignments. Additional time in the lab will be offered for students who want more help with the online portion of their work. Lab work may also be completed on students' own machines at any time

COURSE AGENDA

Lecture 1 Introduction to binformatics	
[Date]	Learning objectives: To introduce the theoretical concept of Bioinformatics and the link with public health and medicine including the relevance to health policy and management References: • Edward H. Shortliffe and Marsden S. Blois. Biomedical Informatics: The Science and the Pragmatics. in Biomedical Informatics, Computer Applications in Health Care and Biomedicine, 4th Edition" E.H. Shortliffe, J.J. Cimino (Eds.), Springer, 2014 • Edwards D, Stajich J, Hansen D. Bioinformatics Tools and Applications. Edwards D, editor. Media. Springer; 2009.

Kuliah 2 Genomic sequences. Online databases. Intro to sequence alignment	
[Date]	Learning objectives : Introduce the tools, especially online tools for bioinformatics such as Genebank, BLAST, Protein database etc References: • Edward H. Shortliffe and Marsden S. Blois. Biomedical Informatics: The Science and the Pragmatics. in Biomedical Informatics, Computer Applications in Health Care and Biomedicine, 4th Edition" E.H. Shortliffe, J.J. Cimino (Eds.), Springer, 2014 • Edwards D, Stajich J, Hansen D. Bioinformatics Tools and Applications. Edwards D, editor. Media. Springer; 2009.

Kuliah 3 Finding information in online databases	
[Date]	Learning objectives : Introcude features and function of famous online tools used in bioinformatics application References: • Edward H. Shortliffe and Marsden S. Blois. Biomedical Informatics: The Science and the Pragmatics. in Biomedical Informatics, Computer Applications in Health Care and Biomedicine, 4th Edition" E.H. Shortliffe, J.J. Cimino

(Eds.), Springer, 2014
- Edwards D, Stajich J, Hansen D. Bioinformatics Tools and Applications. Edwards D, editor. Media. Springer; 2009.

Kuliah 4 Database searching; BLAST

[Date]

Learning objectives :
To introduce BLAST, and its features

References:
- Edward H. Shortliffe and Marsden S. Blois. Biomedical Informatics: The Science and the Pragmatics. in Biomedical Informatics, Computer Applications in Health Care and Biomedicine, 4th Edition" E.H. Shortliffe, J.J. Cimino (Eds.), Springer, 2014
- Edwards D, Stajich J, Hansen D. Bioinformatics Tools and Applications. Edwards D, editor. Media. Springer; 2009.

Kuliah 5 Tools on Bioinformatics

[Date]

Learning objectives :
- Online tools such as multiple sequence alignment, phylogenetic analysis etc

Reading:
1. Biomedical Informatics, Computer Applications in Health Care and Biomedicine, 4th Edition" E.H. Shortliffe, J.J. Cimino (Eds.), Springer, 2014

Kuliah 6 Analysis on Bioinformatics: sequence analysis

[Date]

Tujuan pembelajaran:
- Introduce some analysis for bioinformatics
- Sequence analysis
- Gene analysys
- Relationship with disease surveillance

Reading:
- Edward H. Shortliffe and Marsden S. Blois. Biomedical Informatics: The Science and the Pragmatics. in Biomedical Informatics, Computer Applications in Health Care and Biomedicine, 4th Edition" E.H. Shortliffe, J.J. Cimino (Eds.), Springer, 2014
- Edwards D, Stajich J, Hansen D. Bioinformatics Tools and Applications. Edwards D, editor. Media. Springer; 2009.

Kuliah 7 Analysis on Bioinformatics: working with gene data

[Date]

Learning objectives :
Gene data analysis introduction

References:

- Edward H. Shortliffe and Marsden S. Blois. Biomedical Informatics: The Science and the Pragmatics. in Biomedical Informatics, Computer Applications in Health Care and Biomedicine, 4th Edition" E.H. Shortliffe, J.J. Cimino (Eds.), Springer, 2014
- Edwards D, Stajich J, Hansen D. Bioinformatics Tools and Applications. Edwards D, editor. Media. Springer; 2009.

Kuliah 8 Bioinformatics for Public Health Surveillance

[Date]

Learning objectives :

Introduce the data analysis on bioinformatics fields and the relevance on public health surveillance

References:

W. Edward Hammond, Charles Jaffe, James J. Cimino, and Stanley M. Huff. Standards in Biomedical Informatics in Biomedical Informatics, Computer Applications in Health Care and Biomedicine, 4th Edition" E.H. Shortliffe, J.J. Cimino (Eds.), Springer, 2014

Kuliah 9 Bioinformatics for disease control

[Date]

Learning objectives :

Introduce the data analysis on bioinformatics fields and the relevance on public health surveillance and sisease control strategy

References:

Biomedical Informatics, Computer Applications in Health Care and Biomedicine, 4th Edition" E.H. Shortliffe, J.J. Cimino (Eds.), Springer, 2014

Kuliah 10 Data mining in Bioinformatics

[Date]

Learning objectives :

1. Introduce concept and theory of data mining

References:

- Edward H. Shortliffe and Marsden S. Blois. Biomedical Informatics: The Science and the Pragmatics. in Biomedical Informatics, Computer Applications in Health Care and Biomedicine, 4th Edition" E.H. Shortliffe, J.J. Cimino (Eds.), Springer, 2014
- Edwards D, Stajich J, Hansen D. Bioinformatics Tools and Applications. Edwards D, editor. Media. Springer; 2009.

Kuliah 11 Group presentation 1

[Date] Learning objectives :

- Students presentation related to assginment

References:

Kuliah 12 Group presentation 2

[Date] Learning objectives :

- Students presentation related to assginment

References:

EXAMINATION

[Date]

LABORATORY WORKS AND TUTORIALS

Tutorial akan dilakukan sebanyak 6 kali dengan waktu kegiatan masing-masing 90 menit disertai dengan satu kali site visit ke fasilitas kesehatan.

Tutorial 1 Online database

[Date] Tujuan pembelajaran:

- Learn some online tools on bioinformatics that is commonly used such as genebank and blast

Reading:

Assignment:
Perform Phylogenetic analysis

Tutorial 2 Sequence analysis for public health surveillance: dengue surveillance

[Date] Tujuan pembelajaran

- Learn some analysys on bioinformatics that is commonly used such as sequence analysis

Reading:

Assignment:
Analyze dengue sequence

Tutorial 3 Data mining and analysis	
[Date]	Tujuan pembelajaran ▪ Learn technique for data mining in health Reading: Assignment: Data mining using data from microarray