REGULATIONS FOR THE DEGREE OF
BACHELOR OF SCIENCE IN BIOINFORMATICS
(BSc[BioInf])

These regulations apply to students admitted in the academic year 2008-2009 and thereafter.

(See also General Regulations and Regulations for First Degree Curricula)

Admission to the degree

BMS1   To be eligible for admission to the degree of Bachelor of Science in Bioinformatics, candidates shall
- (a)   comply with General Regulations;
- (b)   comply with the Regulations for First Degree Curricula; and
- (c)   satisfy all the requirements of the curriculum in accordance with the regulations that follow and the syllabuses of the degree.

Length of study

BMS2   The curriculum shall normally require six semesters of full-time study, spreading over three academic years.

Completion of curriculum

BMS3   To complete the curriculum, candidates shall
- (a)   satisfy the requirements prescribed in UG3 of the Regulations for First Degree Curricula and a further 3 credits of courses in English language enhancement.
- (b)   complete satisfactorily not less than 180 credits of courses, in the manner specified in the syllabuses, which shall include credits from all core courses in accordance with the syllabuses.

Selection of courses

BMS4   (a)   Candidates shall normally take not less than 24 and not more than 36 credits of courses in each semester, unless otherwise permitted or required by the Board of Studies.
- (b)   Candidates shall have to satisfactorily complete the prerequisite courses in order to enrol in succeeding courses, unless with exemption granted by the course coordinators of the courses concerned.
- (c)   Candidates with unsatisfactory academic progress may be required by the Board of Studies to take a reduced study load.
- (d)   Candidates shall select their courses in accordance with these regulations and the guidelines specified in the syllabuses before the beginning of each academic year.

Assessment and grades

BMS5   (a)   Candidates shall be assessed for each of the courses which they have registered for, and assessment may be conducted in any one or any combination of the following manners: written examinations or tests, continuous assessment, laboratory work, field work, project reports, or in any other manner as specified in the syllabuses.

(b)   Grades shall be awarded in accordance with UG5 of the Regulations for the First Degree Curricula.

(c)   Written examinations shall normally be held at the end of each semester unless otherwise specified in the syllabuses.

(d)   Candidates who fail in any core course may be required by the Board of Studies to repeat the same course in a subsequent semester, and/or to be re-assessed at a time and in a manner specified by the Board. The grades for all attempts made by a candidate will be recorded in his/her transcript.

(e)   Candidates shall not be permitted to repeat a course for which they have received a grade D or above for upgrading purposes.

Discontinuation

BMS6   A candidate will normally be recommended for discontinuation of his/her studies if
(a)   his/her semester GPA is unsatisfactory (<1.0) for any academic year; or
(b)   he/she has failed in a core course three times; or
(c)   he/she has passed less than 30 credits of courses for any academic year.

Absence from examination

BMS7   Candidates who are unable to be present at any examination of a course because of illness or other special circumstances may apply for permission to present themselves for examination at some other time. Any such application shall be made on the form prescribed within two weeks of the first day of the candidates' absence from any examination.

Advanced standing

BMS8   (a)   Advanced standing in a course of study may be granted to candidates who have successfully completed a similar course at other universities or comparable institutions. The amount of advanced credits to be granted shall be determined by the Board of Studies, in accordance with the following principles:
(i) a minimum of two years of study at this University shall be required before the candidate is considered for the award of the degree; and
(ii) a minimum of 120 credits shall be gained in this University.

(b)   Advanced credits granted to a candidate shall not be included in the calculation of his/her cumulative GPA.

Degree classification

BMS9   The degree of BSc (BioInf) shall be awarded in five divisions:
(a)   First Class Honours
(b)   Second Class Honours Division One
(c)   Second Class Honours Division Two
(d)   Third Class Honours
(e)   Pass

SYLLABUS FOR THE DEGREE OF
BACHELOR OF SCIENCE IN BIOINFORMATICS

	Course	Credits	Semester
Year 1			
BIOC1001	Basic Biochemistry	6	1
CSIS1117	Computer Programming I	6	1
STAT1306[1]	Introductory Statistics	6	1
ECEN1515	Professional and Technical Oral Communication for Engineers	3	1
CBIO0001	Practical Chinese Language Course for BSc(BioInf) Students	3	1

BIOC1003	Introduction to Molecular Genetics	6	2
BIOC1805	Elements of Bioinformatics	6	2
CSIS1122	Computer Programming II	6	2
ECEN1503	English for Computer Science	3	2
HSSELEC[2]	Humanities and Social Sciences Studies Elective	3	2

ELEC	Elective subjects	12	1+2
Year 2			
BIOC2603	Principles of Molecular Genetics	6	1
BIOC2808	Sequence Bioinformatics	6	1
CSIS0396	Object-Oriented Programming and Java	6	1
CSIS1119	Introduction to Data Structures and Algorithms	6	1

BIOC2604	Essential Techniques in Biochemistry and Molecular Biology	6	2
CSIS0278	Introduction to Database Management Systems	6	2
BIOC2811	Structural Bioinformatics	6	2

ELEC[3]	Elective subjects	12	1+2
GE&B	General Education and Broadening	6	1+2
Year 3			
BIOC3808	Genomic Bioinformatics	6	1

BIOC3613	Molecular Biology of the Gene	6	2
BIOC2811	Structural Bioinformatics	6	2

BIOC3814	Bioinformatics Project	12	1+2
ELEC[3]	Elective subject(s)	◄ 24	1+2
GE&B	General Education and Broadening	6	1+2

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[1] STAT0301 may be taken with permission. Students wishing to pursue statistical genetics should take STAT1301 and STAT1302 in preference.
[2] HSSELEC may be taken at a different time.
[3] Electives taken must include at least 6 credits of 2nd or 3rd year level Biochemistry courses.

Core Course Descriptions

BIOC1001   Basic biochemistry (6 credits)

The course is designed to present an overview of biochemistry and to provide an understanding of the basic mechanisms underlying life processes. This is an independent course which can be taken by students from various disciplines. It also prepares students for further studies in Biochemistry and Molecular Biology.
Prerequisite: AS Biology or AS Chemistry

BIOC1003   Introduction to molecular genetics (6 credits)

The objectives of this course are to provide students with basic and up-to-date knowledge on the structure and functions of nucleic acids, to give students a general picture of the molecular process of gene expression, and to introduce students to recombinant DNA technology.
Prerequisite: AS Biology or AS Chemistry

CSIS1117   Computer programming I (6 credits)

The goal of this course is for students to learn the general principles of programming, including how to design, implement, document, test, and debug programs.
Prerequisite: Nil

CSIS1119   Introduction to data structures and algorithms (6 credits)

Arrays, linked lists, trees and graphs; stacks and queues; symbol tables; priority queues, balanced trees; sorting algorithms; complexity analysis.
Prerequisite: CSIS1117 or ELEC1501 or ENGG1002
Pre-/Co-requisite: CSIS1122

CSIS1122   Computer programming II (6 credits) [for intake of 2006 and thereafter]

This is the second programming course following ENGG1002/CSIS1117. The goal of this course is to strengthen students' programming skills, in particular, on implementing basic data structures and algorithms. Students will also learn various tools for developing programs in the UNIX/Linux environment.
Prerequisite: CSIS1117 or ELEC1501 or ENGG1002

STAT1306   Introductory statistics (6 credits)

Presentation of data, Variability and Uncertainty, Measures of Central Tendency, Measures of Dispersion, Basic Probability Theory and Techniques, Random Variables and Probability Distributions, Random Samples, Point Estimation, Normal Sampling Theorem, Confidence Intervals, Hypotheses Testing, Simple Linear Regression and Correlation.
Prerequisite: A-level Pure Mathematics or AS-level Mathematics & Statistics or equivalent.

BIOC1805   Elements of bioinformatics (6 credits)

To introduce the main concepts, software and databases used in Bioinformatics. Students will learn the PERL scripting language to implement basic bioinformatics tasks.
Prerequisite: CSIS1117 or ELEC1501
Co-requisite: BIOC1003 or equivalent

ECEN1503   English for computer science (3 credits)

The course is designed to enable 1st year computer science majors to acquire technical and professional communication skills. The focus is on developing students' understanding and use of language in spoken and written communication. Topics include: eliciting requirements in interviews with users; responding to questions and negotiating meaning in interviews; making appropriate grammatical and lexical choices; conducting effective oral presentations; writing effectively with a focus on content, form and language. Students engage in both individual and group work to conduct workplace interviews, oral presentations, and write proposals.

ECEN1515   Professional and technical oral communication for engineers (3 credits)

This course focuses on students developing technical and professional spoken English skills. Throughout the course, the students will give a series of presentations which will help them to improve skills such as accessing, abstracting, analysing, organizing and summarizing information; asking questions and negotiating meanings; making effective grammatical and lexical choices and using visual aids to ensure meaning is clear. The presentations give the students an opportunity to develop the skills to talk about general issues in Engineering in the Hong Kong context, engineering theories and their practical applications and also requires them to present a detailed exploration of one aspect of engineering related to their chosen major. Assessment is wholly by coursework.
Prerequisite: Nil

CBIO0001   Practical Chinese language course for BSc(BioInf) students (3 credits)

This course aims to sharpen student's skills in practical Chinese writing and oral presentation. It considers the fundamentals of modern Chinese language, simplified Chinese characters, traditional Chinese characters, office documents, target-oriented writings for Bioinformatics professionals as well as the techniques of presentation and communication.
Prerequisite: Nil

BIOC2603   Principles of molecular genetics (6 credits)

To provide basic knowledge on molecular genetics, illustrating modern concepts with current experimental approaches and computer-assisted programmes.
Prerequisites: BIOC1001 or BIOC1003 or BIOL1102 or BIOL1122 or BIOL1125 or BIOL1106

BIOC2604   Essential techniques in biochemistry and molecular biology (6 credits)

To give students a general overview of different experimental approaches and model systems, and to provide students with hands-on experience in basic biochemical and molecular techniques.
Prerequisites: BIOC1001 or BIOC1003 or BIOL1102 or BIOL1122 or BIOL1125 or BIOL1106

BIOC2808   Sequence bioinformatics (6 credits)

This course will focus on the methods and algorithms for DNA and protein sequence analysis, database searching, and phylogenetic analysis. Some knowledge of programming and algorithms is assumed.
Prerequisites: BIOC1003, BIOC1805, CSIS1117 and ELEC1501 or equivalent.
Co-requisite: CSIS1119 or equivalent

BIOC2811   Structural bioinformatics (6 credits)

To introduce the bioinformatic study of protein structure and the proteome. This will cover the principles of protein structure, protein classification and identification, the structure determination and modelling of proteins and protein-protein interactions.
Prerequisites: BIOC1001, BIOC1003, BIOC2808

BIOC3808   Genomic bioinformatics (6 credits)

To present bioinformatics topics applicable to genomic biology and the "post-genome" phase of molecular biology.
Prerequisite: BIOC2808

CSIS0278   Introduction to Database Management Systems (6 credits)

This course studies the principles, design, administration, and implementation of database management systems. Topics include: entity-relationship model, relational model, relational algebra and calculus, database design and normalization, database query languages, indexing schemes, integrity, concurrency control, and query processing. This course may not be taken with BUSI0052.
Prerequisite: CSIS1119 or ELEC1501 or ELEC1502

CSIS0396   Object-oriented programming and java (6 credits)

Introduction to object-oriented programming; abstract data types and classes; inheritance and polymorphism; object-oriented program design; Java language and its program development environment; user interfaces and GUI programming; collection class and iteration protocol; program documentation.
Prerequisite: CSIS1117 or ELEC1501 or ENGG1002

BIOC3613   Molecular biology of the gene (6 credits)

To provide an up-to-date knowledge of molecular biology, especially with respect to the regulation of eukaryotic gene expression, molecular embryology.
Prerequisite: BIOC2603 or BIOL2303 or BIOL3308

BIOC3814   Bioinformatics project (12 credits)

Students will be required to take a bioinformatics project which demands substantial work under the supervision of a teacher.

General Education and Broadening

General Education and Broadening electives taken may not include subjects offered by the Faculties of Science and Engineering.

Other Elective Courses

Elective courses may be taken from any courses, from any faculty, for which the student is qualified. Students are suggested to consider taking more subjects in either Biochemistry and/or Computer Science. For descriptions of Biochemistry courses please see the listings under the BSc syllabuses of the Faculty of Science. For Computer Science courses please see listings under the BEng(CS) syllabuses of the Faculty of Engineering.

In particular students are highly recommended to take BIOC2601 "Metabolism", BIOC3609 "Molecular Medicine", and BIOC3615 "Advanced Techniques in Biochemistry and Molecular Biology". Students should note that one Biochemistry subject, in addition to those specified in the syllabus above, must be taken.

From Computer Science, courses with more direct utility for Bioinformatics are CSIS0250 "Design and Analysis of Algorithms" and CSIS0270 "Artificial Intelligence". Students wishing to take broader options in computer science should take CSIS1120 "Machine Organisation and Assembly Language Programming".