# BIOINFORMATICS BA/BS

Bioinformatics is a discipline that applies Computer Science as a tool to solve problems in molecular biology.  The degree has been developed in collaboration between Computer Scientists and Biologists.  Mathematics course work is also represented, as an understanding of statistics is necessary when working as a bioinformatics scientist.  This is truly a unique and interdisciplinary degree.   This degree is designed as a gateway for students who will pursue graduate programs (MS and PhD) in Bioinformatics and Computational Biology.  Students will also have the training to enter the work force as system analysts working with large data sets in clinical research, government research labs, biotechnology and pharmaceutical companies.  Our faculty conduct bioinformatics research with a focus on image processing (MRI and histology images), and also genomics and molecular genetics (for example, studying genes associated with behavior/neural processing in mammals or genes involved in regulation drought-tolerance in crops).

The goals of the bioinformatics program are to provide students with learning experiences in both the classroom and laboratory so that they are **well-prepared** to:

- Think critically and apply knowledge in novel contexts;
- Understand the computational analysis of biological systems;
- Understand cell and genome structures, function, and reproduction;
- Understand algorithms and data structures;
- Perform basic laboratory procedures in a safe manner.

## General Education Requirements

| Code | Title | Credits |
|---|---|---|
| **Written Communication** | | |
| Select one of the following: | | 6.00 |
| ENGL-101 & ENGL-102 | WRITING AND RHETORIC I and WRITING AND RHETORIC II | |
| ENGL-109 | COLLEGE WRITING AND RESEARCH | |
| **Oral Communication** | | |
| Select one from the following: | | 3.00 |
| COMM-101 | FUNDAMENTALS OF ORAL COMMUNICATION | |
| COMM-203 | SMALL GROUP COMMUNICATION | |
| COMM-204 | PUBLIC SPEAKING | |
| **Mathematical Ways of Knowing** | | |
| Select one of the following: | | 3.00-5.00 |
| MATH-143 | COLLEGE ALGEBRA | |
| MATH-147 | COLLEGE ALGEBRA AND TRIGONOMETRY | |
| MATH-170 | CALCULUS I | |
| **Humanistic & Artistic Ways of Knowing** | | |
| Select one course from two categories: | | 6.00-8.00 |
| **Literature** | | |
| ENGL-175 | LITERATURE AND IDEAS | |
| ENGL-257 | WORLD CLASSICS | |
| ENGL-258 | INTERNATIONAL LITERATURE | |
| ENGL-261 | MYTHOLOGIES | |
| **Arts** | | |
| ART-100 | INTRODUCTION TO ART | |
| HUM-101 | THE ART AND HISTORY OF THE MOTION PICTURE | |
| HUM-150 | INTRODUCTION TO THE ARTS | |
| MUS-101 | SURVEY OF MUSIC | |
| MUS-102 | MUSIC IN AMERICA | |
| MUS-150 | WORLD MUSIC | |
| MUS-151 | HISTORY OF MUSICAL THEATER | |
| THEA-101 | SURVEY OF THE THEATER | |
| **Language** | | |

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|---|---|---|
| NP-101 | ELEMENTARY NEZ PERCE LANGUAGE I | |
| NP-102 | ELEMENTARY NEZ PERCE LANGUAGE II | |
| SPAN-101 | ELEMENTARY SPANISH I | |
| SPAN-102 | ELEMENTARY SPANISH II | |
| **Scientific Ways of Knowing** | | |
| CHEM-111 | PRINCIPLES OF CHEMISTRY I | 4.00 |
| CS-108 | INTRODUCTION TO COMPUTER SCIENCE | 4.00 |
| **Social & Behavioral Ways of Knowing** | | |
| Select one course from two disciplines: | | 6.00 |
| ANTH-102 | CULTURAL ANTHROPOLOGY | |
| ANTH-120 | WORLD PREHISTORY | |
| ANTH-170 | INTRODUCTION TO NATIVE AMERICAN STUDIES | |
| ECON-201 | PRINCIPLES OF MACROECONOMICS | |
| ECON-202 | PRINCIPLES OF MICROECONOMICS | |
| GEOG-102 | INTRODUCTION TO GEOGRAPHY | |
| HIST-101 | WORLD HISTORY I | |
| HIST-102 | WORLD HISTORY II | |
| HIST-111 | UNITED STATES HISTORY I | |
| HIST-112 | UNITED STATES HISTORY II | |
| HRPT-184 | DIVERSITY IN ORGANIZATIONS | |
| HRPT-185 | HUMAN RELATIONS IN ORGANIZATIONS | |
| POLS-101 | AMERICAN NATIONAL GOVERNMENT | |
| POLS-237 | INTERNATIONAL POLITICS | |
| POLS-285 | COMPARATIVE GOVERNMENT | |
| PSYC-101 | INTRODUCTION TO GENERAL PSYCHOLOGY | |
| PSYC-205 | LIFESPAN DEVELOPMENTAL PSYCHOLOGY | |
| SOC-101 | INTRODUCTION TO SOCIOLOGY | |
| SOC-102 | SOCIAL PROBLEMS | |
| SS-184 | DIVERSITY IN ORGANIZATIONS | |
| SS-185 | HUMAN RELATIONS IN ORGANIZATIONS | |
| **Diversity** | | |
| Select one of the following: | | 3.00-4.00 |
| ANTH-102 | CULTURAL ANTHROPOLOGY | |
| ANTH-120 | WORLD PREHISTORY | |
| ANTH-170 | INTRODUCTION TO NATIVE AMERICAN STUDIES | |
| ANTH-360 | RACE AND ETHNICITY | |
| COMM-345 | COMMUNICATION AND DIVERSITY | |
| ENGL-258 | INTERNATIONAL LITERATURE | |
| ENGL-474 | NATIVE AMERICAN WRITTEN LITERATURE | |
| GEOG-102 | INTRODUCTION TO GEOGRAPHY | |
| HIST-101 | WORLD HISTORY I | |
| HIST-102 | WORLD HISTORY II | |
| HIST-111 | UNITED STATES HISTORY I | |
| HIST-112 | UNITED STATES HISTORY II | |
| HRPT-184 | DIVERSITY IN ORGANIZATIONS | |
| ID-300C | ETHICS AND IDENTITY | |
| KIN-220 | SOCIAL-CULTURAL ASPECTS OF SPORTS | |
| NP-101 | ELEMENTARY NEZ PERCE LANGUAGE I | |
| NP-102 | ELEMENTARY NEZ PERCE LANGUAGE II | |
| POLS-285 | COMPARATIVE GOVERNMENT | |
| SOC-101 | INTRODUCTION TO SOCIOLOGY | |
| SPAN-101 | ELEMENTARY SPANISH I | |

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| SPAN-102 | ELEMENTARY SPANISH II | |
| SPAN-201 | INTERMEDIATE SPANISH I | |
| SPAN-202 | INTERMEDIATE SPANISH II | |
| SS-184 | DIVERSITY IN ORGANIZATIONS | |
| **Integrative Seminar: Ethics & Values** | | |
| Select one of the following: | | 3.00 |
| ID 300A - 300Z (see course descriptions for options) | | |
| ID-301A | HELLS CANYON INSTITUTE | |
| **Foreign/Heritage Language** | | |
| Select 16 credits of language if selecting Bachelor of Arts Degree | | 16.00 |
| Total Credits | | 38.00 |

# Program Requirements

| Code | Title | Credits |
|---|---|---|
| **Major Requirements** | | |
| BIOF-100 | INTRODUCTION TO BIOINFORMATICS | 3.00 |
| BIOF-301 | COMPUTATIONAL GENOMICS | 3.00 |
| BIOF-350 | IMAGE ANALYSIS | 4.00 |
| BIOF-495 | PRACTICUM IN BIOINFORMATICS | 4.00 |
| BIOL-182 | CONCEPTS IN CELLULAR MECHANISMS | 4.00 |
| BIOL-341 | GENETICS | 4.00 |
| BIOL-355 | GENERAL MICROBIOLOGY | 4.00 |
| or BIOL-362 | CELLULAR AND MOLECULAR BIOLOGY | |
| CHEM-112 | PRINCIPLES OF CHEMISTRY II | 4.00 |
| CHEM-371 | ORGANIC CHEMISTRY I | 3.00 |
| CHEM-373 | ORGANIC CHEMISTRY I LAB | 1.00 |
| CHEM-481 | BIOCHEMISTRY I | 4.00 |
| CS-111 | FOUNDATIONS OF PROGRAMMING | 4.00 |
| CS-211 | COMPUTER SCIENCE II | 4.00 |
| CS-226 | SQL: STRUCTURED QUERY LANGUAGE | 3.00 |
| CS-253 | INTRO TO SYSTEMS PROGRAMMING | 4.00 |
| CS-311 | ALGORITHMS AND DATA STRUCTURES | 4.00 |
| MATH-320 | PROBABILITY AND STATISTICS | 3.00 |
| **Electives** | | |
| Select 23 credits from the following: | | 23.00 |
| CHEM-482 | BIOCHEMISTRY II | |
| CS-360 | SOFTWARE ENGINEERING | |
| CS-401 | FUTURE PROFESSIONALS SEMINAR | |
| CS-420 | ANALYSIS OF ALGORITHMS | |
| CS-430 | OPERATING SYSTEMS | |
| CS-435 | COMPUTER NETWORKS | |
| CS-440 | INTELLIGENT SYSTEMS:AI AND INFORMATION | |
| CS-445 | DATABASES AND KNOWLEDGE MANAGEMENT | |
| CS-475 | COMPUTER SYSTEMS SECURITY | |
| Total Credits | | 83.00 |

# Sequential Plan of Study

| Course | Title | Credits |
|---|---|---|
| **First Year** | | |
| **Fall** | | |
| BIOF-100 | INTRODUCTION TO BIOINFORMATICS | 3.00 |
| CORE | Social & Behavioral Ways of Knowing | 3.00 |

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| CORE | MATH-143 MATH-147 or MATH-170 | 3.00 |
| ENGL-101 | WRITING AND RHETORIC I | 3.00 |
| | Credits | 12.00 |
| **Spring** | | |
| BIOL-182 | CONCEPTS IN CELLULAR MECHANISMS | 4.00 |
| CORE | Oral Communication | 3.00 |
| CS-108 | INTRODUCTION TO COMPUTER SCIENCE | 4.00 |
| ENGL-102 | WRITING AND RHETORIC II | 3.00 |
| | Credits | 14.00 |
| **Second Year** | | |
| **Fall** | | |
| CHEM-111 | PRINCIPLES OF CHEMISTRY I | 4.00 |
| CORE | Humanistic & Artistic Ways of Knowing | 3.00 |
| CORE | Social & Behavioral Ways of Knowing | 3.00 |
| CS-111 | FOUNDATIONS OF PROGRAMMING | 4.00 |
| CS-226 | SQL: STRUCTURED QUERY LANGUAGE | 3.00 |
| | Credits | 17.00 |
| **Spring** | | |
| CHEM-112 | PRINCIPLES OF CHEMISTRY II | 4.00 |
| CORE | Humanistic & Artistic Ways of Knowing | 3.00 |
| CS-211 | COMPUTER SCIENCE II | 4.00 |
| CS-253 | INTRO TO SYSTEMS PROGRAMMING | 4.00 |
| MATH-320 | PROBABILITY AND STATISTICS | 3.00 |
| | Credits | 18.00 |
| **Third Year** | | |
| **Fall** | | |
| BIOF-301 | COMPUTATIONAL GENOMICS | 3.00 |
| BIOL-355 or BIOL-362 | GENERAL MICROBIOLOGY or CELLULAR AND MOLECULAR BIOLOGY | 4.00 |
| CHEM-371 | ORGANIC CHEMISTRY I | 3.00 |
| CHEM-373 | ORGANIC CHEMISTRY I LAB | 1.00 |
| Program Requirement | Bioinformatics Electives [1] | 4.00 |
| | Credits | 15.00 |
| **Spring** | | |
| BIOL-341 | GENETICS | 4.00 |
| CORE | Diversity | 3.00 |
| CS-311 | ALGORITHMS AND DATA STRUCTURES | 4.00 |
| Program Requirement | Bioinformatics Electives [1] | 3.00 |
| Program Requirement | Bioinformatics Electives [1] | 3.00 |
| | Credits | 17.00 |
| **Fourth Year** | | |
| **Fall** | | |
| BIOF-350 | IMAGE ANALYSIS | 4.00 |
| CHEM-481 | BIOCHEMISTRY I | 4.00 |
| Program Requirement | Bioinformatics Electives [1] | 6.00 |
| | Credits | 14.00 |
| **Spring** | | |
| BIOF-495 | PRACTICUM IN BIOINFORMATICS | 4.00 |
| CORE | Integrative Seminar: Ethics & Values | 3.00 |
| Program Requirement | Bioinformatics Electives [1] | 3.00 |

| Program Requirement | Bioinformatics Electives [1] | 4.00 |
| --- | --- | --- |
| | Credits | 14.00 |
| | Total Credits | 121.00 |

[1]     Program Requirement: Select 18-23 credits from the following, CHEM-482, CS-360, CS-401, CS-420, CS-430, CS-435, CS-445, CS-475.

Graduates with a BA/BS in Bioinformatics go on to obtain careers in a variety of fields:

• Research Assistant
• Data Collection/Analysis
• Computer Science