

# M.S. in Bioinformatics

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The Master of Science in Bioinformatics is a Professional Science Master's (PSM) degree designed with the concept of training science professionals as part of the national effort in developing PSM degrees to enhance our future economy through promoting innovations in science and technology. Bioinformatics is an interdisciplinary science that offers unique opportunities for individuals with diverse backgrounds to learn and collaborate with others. There is an increasing demand for well-trained bioinformatics professionals capable of developing computational tools integrated with experimentation for solving complex biological problems. In addition to required coursework, students attend the weekly bioinformatics colloquium series, with research seminars and professional training workshops, and complete an internship at a bioinformatics company or research institution. Training areas include genomics data analysis, molecular modeling, and online database development, preparing graduates for various technical fields in agriculture, biodiversity and environmental science, cancer research, drug design, genetic and infectious diseases, and health data management.

## Admission Requirements

The following documents are required in the online application for admission to the Bioinformatics M.S. Program:

1. A completed Graduate School Application form.
2. Official copies of transcripts and GRE/TOEFL scores.
3. A statement of purpose summarizing professional goals.
4. At least two letters of recommendation.
5. Applicants from countries where English is not the first language are required to demonstrate English proficiency. Please consult the graduate school (<http://catalog.utep.edu/admissions/graduate/graduate-student/>) website for required scores

Prior to making a recommendation on acceptance to the Graduate School, the Bioinformatics Admissions Committee will review the academic preparation of applicants. Unconditional admission requires a completed bachelor's degree that includes satisfactory undergraduate coursework experiences in Biology, Chemistry, Computer Science, Mathematics, and Statistics. This foundation is represented by the following UTEP courses and their several underlying prerequisites (or by the equivalent experience at other institutions):

| Code      | Title                          | Hours |
|-----------|--------------------------------|-------|
| BIOL 3314 | Molecular Cell Biology         | 3     |
| CHEM 2324 | Organic Chemistry              | 3     |
| CS 2401   | Elem. Data Struct./Algorithms  | 4     |
| MATH 2300 | Discrete Mathematics           | 3     |
| STAT 2480 | Elementary Statistical Methods | 4     |

Course descriptions and prerequisites of these courses are provided in the UTEP *Undergraduate Catalog*. Because this suite of foundation courses is seldom met by traditional undergraduate curricula, potential applicants should make early inquiry of the Program Director for consultation on its expeditious completion.

## Degree Requirements

The Master of Science degree in Bioinformatics consists of 40-41 graduate hours comprised of required courses and electives drawn from a restricted menu. The program of study is intended to be a course-intensive experience requiring two years of full-time academic work, including a summer internship in the public or private sector between the first and second years. The internship is required of all students in the program and it can be counted as a three-credit-hour elective course. A thesis is an option but not a requirement for this degree.

### I. Internship

The student is responsible for securing an internship offer from an academic, industry, or government institution that is a current or potential employer of bioinformatics professionals. For the internship to count towards the Master of Science degree in Bioinformatics, the student must obtain pre-approval from the Bioinformatics Program Committee before the start of the internship. An evaluation form will be sent to the employer at the end of the internship and the student must receive a grade of "Satisfactory" or better in order to fulfill the internship requirement of this degree.

### II. Courses

Thesis courses. Six (6) hours of thesis courses BINF 5398 and BINF 5399 can be taken in place of regular elective course to count towards the MS in Bioinformatics degree. All University requirements for master's theses apply.

A maximum of up to six (6) credit hours of approved advanced undergraduate courses in Biology, Chemistry, Computer Science, Mathematics, or Statistics. Only undergraduate courses which are listed as applicable towards graduate degrees by the Graduate School can be counted towards the MS in Bioinformatics degree (see *Graduate Catalog* listings under individual departments). Approval from the Graduate Advisor is required.

With the approval of the Bioinformatics Program Committee and the Graduate School, up to six (6) semester hours of graduate work can be transferred from another accredited institution to replace equivalent courses. Only credit hours that have not been counted towards a previously awarded degree are allowed to be transferred.

## Degree Plan

Required Credits: 41

| Code   | Title                          | Hours |
|--|--------------------------------|-------|
| <b>MS in Bioinformatics (All courses require a grade of C or better)</b> |                                |       |
| <b>Seminars</b>  |                                |       |
| Select four semesters from the following:                                |                                | 4     |
| BINF 5110  | Biology Seminar/Bioinformatics |       |
| BINF 5111  | Chem. Sem. for Bioinformatics  |       |
| BINF 5112  | CS Seminar for Bioinformatics  |       |
| BINF 5113  | Math Sem. for Bioinformatics   |       |
| <b>Required Courses:</b>   |                                |       |
| BINF 5341  | Anal./Model of Bio Structures  | 3     |
| BINF 5351  | Intro. Bioinformatics I        | 3     |
| BINF 5352  | Intro. Bioinformatics II       | 3     |
| BINF 5354  | Post-Genomic Analysis          | 3     |
| BIOL 5340  | Structure/Funct Macromolecules | 3     |
| CS 5352  | Computer Security              | 3     |
| STAT 5329  | Statistical Programming        | 3     |
| STAT 5428  | Intro to Statistical Analysis  | 4     |
| <b>Internship:</b>   |                                |       |
| BINF 5353  | Internship in Bioinformatics   | 3     |
| <b>Electives:</b>  |                                |       |
| Select three courses from the following:                                 |                                | 9     |
| BINF 5398  | Thesis                         |       |
| BINF 5399  | Thesis                         |       |
| BIOL 5302  | Resrch Biological Science      |       |
| BIOL 5316  | Biosystematics                 |       |
| BIOL 5326  | Advances Immunological Concept |       |
| BIOL 5329  | Physiology of Bacterial Cell   |       |
| BIOL 5344  | Molecular Pathogenesis         |       |
| CHEM 5329  | Contem Topics Organic Chemistr |       |
| CHEM 5339  | Contemp Topics in Biochemistry |       |
| CHEM 5396  | Graduate Research in Chemistry |       |
| CS 5334  | Parallel & Concurrent Program  |       |
| CS 5341  | Advanced Computer Architecture |       |
| CS 5350  | Advanced Algorithms            |       |
| CS 5351  | Interval Computations          |       |
| CS 5391  | Individual Studies             |       |
| CS 5396  | Graduate Projects              |       |
| CS 5397  | Graduate Projects              |       |
| MATH 5330  | Comp Methods of Linear Algebra |       |
| MATH 5335  | Techniques in Optimization     |       |
| MATH 5396  | Graduate Research              |       |
| STAT 5336  | Categorical Data Analysis      |       |
| STAT 5386  | Stochastic Processes           |       |
| STAT 5388  | Multivariate Data Analysis     |       |
| STAT 5391  | Time Series Analysis           |       |
| STAT 5392  | Statistical Computing          |       |

STAT 5396

Graduate Research

Total Hours

41

## Program Director

Ming-Ying Leung (<http://facultyprofile.utep.edu/default.aspx?ID=mleung>)

## Professors

Ming-Ying Leung (<http://facultyprofile.utep.edu/default.aspx?ID=mleung>)

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## Program Director

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