

BRISTOL
COMMUNITY COLLEGE

&

ELMS
COLLEGE

**Associate in Science in Life Sciences
(Biotechnology and Forensic DNA) at
Bristol Community College,
Fall River, MA
and
B.S. in Biotechnology at Elms College,
Chicopee, MA**

ACADEMIC ARTICULATION AGREEMENT

Associate in Science in Life Sciences (Biotechnology and Forensic DNA) at Bristol Community College, Fall River, MA and the B.S. Biotechnology at Elms College, Chicopee, MA.

The above institutions hereby enter into an agreement for the transfer of Bristol Community College graduates from the *Associate in Science in Life Sciences (Biotechnology and Forensic DNA)* degree program into the Elms College *B.S. Biotechnology* major in Chicopee, MA.

Objectives of this Agreement:

1. To attract qualified students from Bristol Community College to full-time and part-time program options on campus and online at Elms College
2. To promote a seamless transition for students from Bristol Community College's Associate in Science in Life Sciences (Biotechnology and Forensic DNA) to part-time or full-time status in the Elms College Biotechnology major.
3. To provide recommended program *course sequence grids and/or lists* and *course equivalency charts* approved by Bristol Community College and Elms College as pathways to baccalaureate and master's degrees for students considering enrollment in Elms College.

Stipulations of this Agreement:

1. This articulation agreement will be in effect for five years and will be renewable for another five years by consent of Bristol Community College and Elms College. This articulation agreement can be reviewed within 90 days after written notice by either party.
2. This agreement will apply to Bristol Community College transfer students who have completed an Associate's degree. At the time of application, students must have a minimum grade point average of 2.0.
3. This agreement guarantees that students who earn an Associate in Science in Life Sciences (Biotechnology and Forensic DNA) at Bristol Community College will enter Elms B.S. in Biotechnology program with at least 60 accepted transfer credits and third year status. Additional courses taken to satisfy major requirements must meet the standards set by the Division of Natural Sciences, Mathematics, and Technology at Elms College. Students must satisfy the core requirements of Elms College to earn the 120-credit bachelor's degree.
4. Students must complete a 45-credit residency requirement for on campus programs and a 42-credit residency requirement for online and/or accelerated 8-week programs. Elms

College will accept 75 transferrable credits from Bristol Community College students enrolling in on campus programs and 78 transferable credits from Bristol Community College students enrolling in online or accelerated 8-week programs.

5. Students complete the program as a combination of 15-week online courses and on-campus lab courses with some low-residency labs.
6. Students under this agreement will be provided research opportunities within the Biology/Biotechnology departments. Students will work with the department faculty at the Elms to explore these research opportunities.
7. Elms College provides the opportunity for students with full-time status to complete their chosen bachelor's degree program within two years from the date of enrollment. Length of degree completion for part-time students varies.
8. Elms College enrolls interested students who successfully complete the bachelor's degree in Biotechnology program with a GPA of 3.5 to the Master of Biotechnology or Biomedical Sciences programs.
9. This articulation agreement will be in force, and should be considered the entire agreement, until superseded by a formal contract between Elms College and Bristol Community College that explicitly replaces this agreement.
10. Bristol Community College students will be given transfer credit for satisfactorily completing Elms College core requirements, general education requirements, and any acceptable equivalent Biotechnology program requirements, up to the maximum allowed for transfer or necessary to satisfy graduation requirements, at time of admission.

Review and Revision Procedures:

1. Review of this agreement shall take place at least every two years or as needed from the date of the signed agreement. Janet Williams and Sudad Saman in the Division of Natural Sciences, Mathematics, and Technology at Elms College and Sarmad Saman at Bristol Community College will be responsible for the review.
2. At the request of either party, a review of the contents or implementation of this agreement will be conducted by the programs.
3. Janet Williams and Sudad Saman and Sarmad Saman may make changes in the attached *course sequence grids and/or lists* and *course equivalency charts* accepted for Elms transfer credit without renegotiating the entire agreement.

Assistance Provisions:

1. Bristol Community College and Elms College will list this articulation agreement on their websites and in appropriate print documents at their respective institutions.
2. Bristol Community College and Elms College will collaborate in encouraging qualified students to participate in the biotechnology program at Elms College by providing the necessary assistance and supports to assure a seamless transition between the two institutions.
3. Elms College tuition and scholarship information can be found at this link by clicking the + sign next to Undergraduate Tuition & Financial Aid: <https://www.elms.edu/financial-aid/undergraduate-tuition-financial-aid-2022/> Elms received a STEM grant from the National Science Foundation awarding up to \$10,000 per year for students who transfer into STEM majors through 2027. This link provides more information: <https://www.elms.edu/academics/nsmt/elmsstem/>.

Mutual Responsibilities:

1. Bristol Community College Associate in Science in Life Sciences (Biotechnology and Forensic DNA) students will receive appropriate advising from Bristol. The attached *course sequence grids and/or lists* and *course equivalency charts* for Elms College transfer credit assure maximum transfer of credits that meet the core requirements of Elms College and Biotechnology program requirements.


Online and part-time students may seek transfer counseling from Bristol Community College's Transfer Services Office, as well as the Continuing Education Admissions Office at Elms College to compile the required credentials for transfer to the Elms College Biotechnology program. The Office of Admissions at Elms will advise and assist applicants who plan full-time study on the Elms campus.

2. Transfer applicants from Bristol Community College applying under this agreement shall be eligible for Elms College financial aid and housing consideration as appropriate to the selected Biotechnology program option based on full time or part time status on campus or online.
3. The final acceptance of part time and online applicants comes from the Office of Continuing Education Admissions. The final acceptance of full-time applicants to the traditional day program comes from the Director of Admissions at Elms College.

Date: March 21, 2023


ELMS COLLEGE

Harry Dumay, Ph.D., MBA

DocuSigned by:



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President

Walter Breau, Ph.D.

DocuSigned by:



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Vice President of Academic Affairs

Joyce Hampton, Ed.D.

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Associate Vice President of Strategic Initiatives
Dean, School of Arts, Sciences & Prof. Studies

Elizabeth T. Hukowicz, Ed.D.

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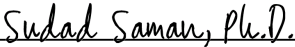
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Dean of School of Continuing Education

Janet Williams, Ph.D.

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Professor of Biology, Director of Postbac and
Master of Biomedical Sciences Programs


Sudad Saman, Ph.D.

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Assistant Professor of Biology

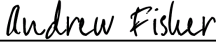
BRISTOL COMMUNITY COLLEGE

Laura L. Douglas, Ph.D.

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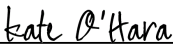
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President

Christine M. Hammond, Ph.D.

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Interim Vice President of Academic Affairs

Kate O'Hara, MBA, M.Ed.

DocuSigned by:



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Vice President of SSEM

Sarmad Saman, Ph.D.

DocuSigned by:


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Dean, Science, Technology,
Engineering and Mathematic

Adrienne Foster-Scharf, Ph.D.

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Coordinator

Bristol Community College Articulation Agreement for Biotechnology Major at Elms College

Course Equivalencies

General Courses (18-19 credits)

| Bristol Community College Course Number | Bristol Community College Course Name | Credits | Elms College Course Number | Elms College Course Name | Credits |
|---|--|---------|----------------------------|--------------------------|---------|
| COM 104 | Public Speaking | 3 | - | No Equivalency* | - |
| CSS 101 | College Success Seminar | 1 | IDS 1001 | First Year Seminar | 3 |
| ENG 101 | Composition I: College Writing | 3 | ENG 1001 | Rhetoric | 3 |
| ENG 102 | Composition II: Writing About Literature | 3 | ENG XXXX | Literature Course | 3 |
| ENG 215 | Technical Writing | 3 | - | No Equivalency** | - |
| MTH 119 | Fundamental Statistics | 3 | MAT 1009 | Elementary Statistics | 3 |
| PSY 101 | General Psychology | 3 | PSY 1001 | General Psychology | 3 |

Elective Courses (6-9 credits)

| Bristol Community College Course Number | Bristol Community College Course Name | Credits | Elms College Course Number | Elms College Course Name | Credits |
|---|---|---------|----------------------------|------------------------------|---------|
| SOC 101 | Principles of Sociology | 3 | SOC 1001 | Introduction to Sociology*** | 3 |
| SOC 257 | Social Issues in Loss | 3 | - | No Equivalency | - |
| EGR 103 | Computer Skills for Engineers/Technicians | 0-3 | CIT 1001 | Introduction to Computers | 3 |
| HIS 113 | US History to 1877 | 3 | HIS 1005 | Early American History | 3 |
| HIS 114 | US History from 1877 | 3 | HIS 1006 | Modern American History | 3 |

*Public Speaking is fulfilled in subject courses through oral and written communication requirements. Since this course is not offered at Elms College it could count as an elective.

**Technical Writing is fulfilled in subject courses through lab reports and research papers. However, this does not fulfill the requirements of technical writing needed to enter a biotechnology company. Since this course is not offered at Elms College, it could count as an elective.

***Introduction to Sociology fulfills the Civic Engagement requirement.

****Introduction to Biotechniques is fulfilled in the various lab classes. This class counts as an elective.

Biotechnology and Forensic DNA Program Courses (41 credits)

| Bristol Community College Course Number | Bristol Community College Course Name | Credits | Elms College Course Number | Elms College Course Name | Credits |
|---|--|---------|----------------------------|-------------------------------------|---------|
| BIO 121 | Fundamentals of Biological Science I | 4 | BIO 1203/ /BIO1203L | General Biology 1 Lecture and Lab | 3 + 1 |
| BIO 126 | Introduction to Biotechnology | 3 | BIO 2330 | Introduction to Biotechnology | 3 |
| BIO 127 | Introduction to Biotechniques**** | 4 | - | No Equivalency | |
| BIO 239 | Elements of Microbiology | 4 | BIO3300/ BIO3300L | Microbiology Lecture and Lab | 3 + 1 |
| BIO 240 | Cell Biology | 4 | BIO 3106 | Cell Biology | 3 |
| INT 210 | Internship Experience | 3 | BIO 4010 | Research Methods | 1-2 |
| BIO 250 | Introduction to Immunology | 4 | BIO 3400 | Immunology | 3 |
| CHM 225 | Biochemistry | 4 | BIO 4306/ BIO 4306L | Biochemistry Lecture and Lab | 3 + 1 |
| SCI 125 | Social & Ethical Issues in Science, Technology, and Health Science | 3 | BMH 3010 | Clinical Research Ethics | 3 |
| CHM 115/ CHM 113 | Chemistry 1 | 4 | CHE 1201/ CHE 1201L | General Chemistry 1 Lecture and Lab | 3 + 1 |
| CHM 116/ CHM 114 | Chemistry 2 | 4 | CHE 1202/ CHE 1202L | General Chemistry 2 Lecture and Lab | 3 + 1 |

Total Number of Incoming Credits = 65-69**Courses successfully completed without Elms equivalencies will count as elective credits.**

Bachelor's Degree Completion in Biotechnology at Elms College**Fall 3rd Year - 15-16 credits**

| Course # | Course Name | Credits |
|------------------------|--|---------|
| CIT 3100 | Data Analytics | 3 |
| CHE 2101/ CHE 2101L | Organic Chemistry 1 Lecture and Lab | 3 + 1 |
| REL XXXX | Religion | 3 |
| XXX XXXX | Electives - Please refer to the list of elective courses for the biotechnology major | 5 - 6 |

Spring 3rd Year - 15-16 credits

| Course # | Course Name | Credits |
|------------------------|--|---------|
| BIO 1204/ BIO 1204L | General Biology 2 Lecture and Lab | 3 + 1 |
| BIO 3330/ BIO 3330L | Advanced Biotechnology Lecture and Lab | 3 + 1 |
| CHE 2102/ CHE 2102L | Organic Chemistry 2 Lecture and Lab | 3 + 1 |
| XXX XXXX | Electives - Please refer to the list of elective courses for the biotechnology major | 3 - 4 |

Fall 4th Year - 15-16 credits

| Course # | Course Name | Credits |
|------------------------|--|---------|
| PHY 1005/ PHY 1005L | General Physics 1 Lecture and Lab | 3 + 1 |
| ART/DAN/MUS | Please choose an elective in Art, Dance, or Music | 3 |
| XXX XXXX | Electives - Please refer to the list of elective courses for the biotechnology major | 8-9 |

Spring 4th Year - 15-16 credits

| Course # | Course Name | Credits |
|------------------------|--|---------|
| PHY 1006/ PHY 1006L | General Physics 2 Lecture and Lab | 3 + 1 |
| XXX XXX | Electives - Please refer to the list of elective courses for the biotechnology major | 11 - 12 |

Total 3rd/4th Year Credits = 60-64

Total Degree Completion Credits = 125-133

Electives

Elective Courses (minimum of 16 credits and four courses with laboratory sections)

BIO3300/3300L Microbiology Lecture and Lab, 3 + 1 credits
BIO4306/4306L Biochemistry Lecture and Lab, 3 + 1 credits
BIO3206/3206L Molecular Biology Lecture and Lab, 3 + 1 credits
BIO3101/3101L Ecology Lecture and Lab, 3 + 1 credits
BIO3106 Cell Biology, 3 credits
BIO3400 Immunology
ENT2XXX Lean LaunchPad for the Life Sciences, 3 credits
BIO4010 Research Methods 1-2 credits
BIO4011 Research Experience 1-2 credits
MAT1301 Calculus I 3 credits
CHE3307/3307L Analytical Chemistry Lecture and Lab, 3 + 1 credits
BMS5700/5700L Histology Lecture and Lab, 3 + 1 credits
BMS 5202 Pharmacology, 3 credits
BMS 5207 Pathology, 3 credits
BMS 5009 Epidemiology & Biostatistics, 3 credits
BMS 5100 Endocrinology, 3 credits
BMS 5700 Histology, 3 credits
BMS 6300 Neuroscience, 3 credits
BMS 6402 Biology of Cancer 3 credits

Course Descriptions

BIO 1204/1204L General Biology Lecture and Lab, 3 + 1 credits

Introduction to organismal, evolutionary, and ecological biology. Lecture explores the diversity of animal and plant life, including the relationships of the major groups of living things. Although it is the fundamental course for biology and related majors, this course is open to non-science majors.

Laboratory follows the concepts covered in the lecture course, especially organismal diversity. The laboratory is required for biology majors.

BIO 3101/3101L Ecology Lecture and Lab, 3 + 1 credits

Ecology is the study of the patterns of distribution and abundance of organisms in space and time. We will take a hierarchical approach first looking at species then populations and communities and finally ecosystems. Special topics will include biodiversity and extinction, the human population explosion, invasive species, and monocultures. Throughout the course the impacts of climate change on each of these topics will be discussed. Field ecology and data analysis using spreadsheets is the focus of this laboratory, which closely matches and reinforces the concepts covered in the lecture.

BIO 3106 Cell Biology, 3 credits

This course is a detailed study of the structure and function of the eukaryotic cell, with an emphasis on the cell membrane and the cytoplasmic organelles. Current concepts in cell communication, molecular targeting within cells and between cells are included in the topics of

study. The laboratory will cover several techniques vital to the study of cells including histology and cell culture techniques. This course fulfills a Communication Intensive requirement. This course is offered in the fall.

BIO 3206/3206L Molecular Biology Lecture and Lab, 3 + 1 credits

This is an introductory course in Molecular Biology with a focus on nucleic acid molecular biology. The course studies the physical aspects of DNA and RNA and how that affects the expression of genes and the ability for us to manipulate DNA and RNA. This introductory course in Molecular Biology focuses on manipulation of DNA for cloning, sequencing, PCR, and CRISPR experiments.

BIO 3300/3300L Microbiology Lecture and Lab, 3 + 1 credits

This is an introductory survey course in the field of microbiology, with an emphasis on clinical microbiology. Topics include the diagnosis and treatment of infectious disease caused by microbes and biological agents. Many different diseases are used to study the diagnosis, treatment, and prevention of infectious disease. Through the study of pathogens, an understanding of microbial structure and function is attained. The laboratory is reflective of the lecture. This is an introductory laboratory in Microbiology.

BIO 3400 Immunology, 3 credits

This is an introductory course in Immunology. This is the study of immunological structures and functions in mammalian systems. The study of immunological organs as well as the structures of non-specific defense will be studied. The course will cover cell mediated and humoral defense mechanisms both non-specific (complement system) and specific.

BIO 4010 Research Methods, 1 – 2 credits

This course will give students an introduction to independent lab research. Students will learn lab techniques and will read the literature and perform literature searches to understand the context of their work in the lab. They will also attend research seminars off campus and/or online webinars. The semester will culminate in a written research proposal.

BIO 4011 Research Experience, 1 – 2 credits

This course will give students an independent research experience. Students will read from the primary literature to understand the context of their work in the lab. They will also attend research talks. The independent research will be statistically analyzed and written up in a poster format which will be presented to the public.

BIO 4306/4306L Biochemistry Lecture and Lab, 3 + 1 credits

This course will focus on the study of chemical reactions that occur in living organisms with special emphasis on proteins, enzymes, lipids, carbohydrates, energy metabolism, acid base balance, and maintenance of homeostasis in the body. This course is vital for students planning to take standardized tests such as the MCAT. The lab focuses on protein biochemistry, specifically protein purification and analysis and enzyme function.

CHE 2101/2101L Organic Chemistry I Lecture and Lab, 3 + 1 credits

A theoretical and practical study of the chemistry of carbon compounds with particular stress on molecular structure, synthesis, and reaction mechanism. The laboratory course will focus on

teaching fundamental techniques in the organic chemistry laboratory: methods to separate components of a mixture, methods to purify an impure compound and techniques for synthesizing organic compounds. The laboratory will engage students in using laboratory methods as a tool for learning about reaction mechanisms.

Prerequisites: CHE 1201-1202.

CHE 2102/2102L Organic Chemistry II Lecture and Lab, 3 + 1 credits

A study of the fundamental facts and theories of chemistry. Topics include thermochemistry, gases, liquids and solids, solutions, gas equilibria, kinetics, acids and bases, solution and precipitation equilibria, complex ions, thermodynamics. The basic techniques that were taught in CHE 2101L will be applied to more advanced applications: multi-step synthesis, mechanism studies, etc. A good portion of the lab will be devoted to a study of spectroscopic methods: IR, NMR, UV/VIS spectroscopy.

Prerequisites: CHE 1201, CHE 1202; CHE 1201L, CHE 1202L; CHE 2101 & CHE 2101L

CHE 3307, CHE 3307L Analytical Chemistry Lecture and Lab, 3 + 1 credits

An introduction to the principles and practice of inorganic quantitative analysis. CHE3307L is a laboratory course designed to accompany and reinforce the concepts covered in CHE3307 analytical chemistry lecture. This course covers analytical techniques in gravimetric analysis, titration, and spectrometry among others.

Prerequisites: CHE 1201 & 1202

CIT 3100 Data Analytics, 3 credits

This course introduces the field of Data Science and Analytics including data extraction, modeling, and visualization using Python and R programming, Tableau, and other tools.

ENT 2XXX Lean LaunchPad for the Life Sciences, 3 credits

Course description in development.

MAT 1301 Differential Calculus, 3 credits

A study of theory of limits, continuity of a function; derivative of function; applications of derivatives. Pre-Calculus recommended prior to taking this course, but is not required.

PHY 1005 General Physics 1 Lecture and Lab, 3 + 1 credits

A survey of mechanics, heat, wave motion, electricity, and modern physics. Required for all students majoring in biology, chemistry, or natural science. The exploration and application of general physics concepts, laws, theories, and principles through laboratory experimentations and analysis

PHY 1006 General Physics II Lecture and Lab, 3 +1 credits

A survey of mechanics, heat, wave motion, electricity, and modern physics. Required for all students majoring in biology, chemistry, or natural science.

Biomedical Science (BMS) courses (6-credit maximum count towards Master's degree)

BMS 5009 Epidemiology & Biostatistics, 3 credits

This course is designed as an introductory course in epidemiology and biostatistics. The instructor might use examples from their own research work to help demonstrate the application of the epidemiology and biostatistics to actual research in the field.

BMS 5100 Endocrinology, 3 credits

A general study of the vertebrate endocrine system, including the structure of the glands, the nature and properties of hormones and hormonal secretion, and the mechanisms of hormone action.

BMS 5202 Pharmacology, 3 credits

This is an introductory course in pharmacology. It is the study of how drugs are assimilated into the body, how they are metabolized, their effects on the body, and how they are excreted. Various aspects of different drugs and their effects on different systems will be investigated. Biochemistry is a prerequisite.

BMS 5207 Pathology, 3 credits

This is an introductory course in pathology. It is a study of how various diseases affect various cells, tissues, organs, and systems of the body.

BMS 5700/5700L Histology Lecture and Lab, 3 + 1 credits

This is a lecture course in histology. It will begin at the light microscopic level of human tissues and cells and delve into the fine, ultrastructure of tissues that are studied through the electron microscope. Fluorescent microscopy will also be studied to better understand the structure and function of tissues and cells.

This is an optional laboratory course in Histology. The laboratory is where students learn the requisite ability to recognize tissues under the light microscope with additional electron microscope examples. The laboratory will also provide the opportunity for students to prepare tissues for identification and examination under the light microscope.

BMS 6300 Neuroscience, 3 credits

This is an introductory course in Neuroscience. The class is designed to cover structure and function of the brain and the nervous system, followed by more advanced aspects of neuroscience.

BMS 6402 Biology of Cancer, 3 credits

This is an online course in the biology of cancer. This course examines cancer in the human body, how cancer develops, how it is diagnosed, and how it is treated. Students should be comfortable with genetics, molecular biology, cell biology and biochemistry in order to take this course. The course is evaluated by students writing topical essays and one exam.

Prerequisites: Cell Biology, Molecular Biology and Biochemistry.