**New York City College of Technology**

**Interdisciplinary Committee**

**Criteria for an Interdisciplinary Course**

1. **Interdisciplinary Studies Definition**

Interdisciplinary studies involve two or more academic disciplines or fields of study organized around synthesizing distinct perspectives, knowledge, and skills. Interdisciplinary study focuses on questions, problems, and topics too complex or too broad for a single discipline or field to encompass adequately; such studies thrive on drawing connections between seemingly exclusive domains. Usually theme-based, interdisciplinary courses intentionally address issues that require meaningful engagement of multiple academic disciplines. Pedagogical strategies focus on, but are not limited to, inquiry or problem-based learning.

Although many academic disciplines, such as African American Studies and Engineering, are inherently interdisciplinary, to be considered an interdisciplinary course at City Tech the course must be team-taught[[1]](#footnote-1) by more than one faculty member from two or more departments[[2]](#footnote-2) in the College. An interdisciplinary course, by definition, has an interdisciplinary theme as its nucleus. In its essence, such a course brings the analytic methods of two or more academic disciplines to bear on a specific problem or question. Thus, a course in Music History is not likely to be considered interdisciplinary, but a course in Music History from an economist’s perspective might very well lead to such a course. The application of different methods and concepts is the key to assessing whether a course is or is not interdisciplinary. The term interdisciplinary is occasionally used to identify individual projects or assignments, but these, though possibly commendable, fall short in the necessary scope for learning experiences that demand in-depth exposure to the methodologies of distinct intellectual disciplines, and the creative application of these methodologies to specific problems.

Studies show that interdisciplinary courses improve student learning (Elrod & Roth, 2012; Klein, 2010; Lattuca, 2001; Lattuca, Voigt, & Fath, 2004; Project Kaleidoscope, 2011). To foster interdisciplinary learning, the Interdisciplinary Committee has identified goals and outcomes that students taking interdisciplinary courses should be able to achieve.

**Learning Outcomes of Interdisciplinary Courses**

Students will be able to:

* Purposefully connect and integrate across-discipline knowledge and skills to solve problems
* Synthesize and transfer knowledge across disciplinary boundaries
* Comprehend factors inherent in complex problems
* Apply integrative thinking to problem-solving in ethically and socially responsible ways
* Recognize varied perspectives
* Gain comfort with complexity and uncertainty
* Think critically, communicate effectively, and work collaboratively
* Become flexible thinkers

**New York City College of Technology**

**Interdisciplinary Committee**

**Application for Interdisciplinary Course Designation**

**Date \_\_\_\_\_11/4//2024\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Submitted by** \_\_\_\_Pam Brown on behalf of Peter Spellane (FT Organic Chemist) and Anna Feitzinger (PT adjunct in the biology dept. and DNA LC staff member\_\_\_\_\_\_\_\_\_\_

**Department(s) \_\_\_\_\_\_\_**Chemistry and Biological Sciences**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

1. **Proposal to Offer an Interdisciplinary Course**

1. Identify the course type and title:

X🞎 An existing course\_\_ Independent Studies course IS 901 ID section,spring 2025, *Exploring Biodiversity at Newtown Creek through DNA Barcoding*

🞎 A new course \_\_\_\_ *\_\_\_\_\_\_\_\_\_\_\_\_\_*

🞎 A course under development \_\_This course was successfully offered in fall 2023 as a pilot with two students. This semester will be scale-up to hopefully a larger group of students. This project is being presented at this year’s poster session.\_\_\_\_\_\_\_\_

1. Provide a course description: Students will learn cutting-edge methodologies that have helped scientists all over the world identify and study biodiversity: DNA barcoding. Students will also learn concepts in conservation biology and genetics and gain hands-on experience performing DNA extractions, PCR, gel electrophoresis, and bioinformatics analyses. Students will apply these skills to conduct an independent research project examining biodiversity in Newtown Creek, a designated Superfund site along the Brooklyn-Queens border. This research will contribute to a growing body of knowledge about how decades of chemical pollution has impacted water quality, ecosystem health, and species richness. Students will select a research project, collect samples from Newtown Creek, carry out experimental protocols, and create and present posters of their findings.
2. How many credits will the course comprise? \_\_\_\_3\_\_ How many hours? \_3 hrs/wk, Th 2:30-5 in the DNA Learning Center\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. What prerequisite(s) would students need to complete before registering for the course? Co-requisite(s)?

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| BIO 1101 |

1. Explain briefly why this is an interdisciplinary course

This course satisfies the definition of an interdisciplinary course - a topic too complex or too broad for a single discipline or field to encompass adequately.Students will be looking at DNA diversity after microorganisms are exposed to industrial waste. Chemistrs do not typically know and understand DNA barcoding. Biologists are not familiar with the chemical “footprint” left from industrial discharge. Both disciplines must contribute to an understanding of this complex and challengine issue.

1. What is the proposed theme of the course? What complex central problem or question will it address? What disciplinary methods will be evoked and applied?

The proposed theme is an examination of the impact of industrial pollution on biodiversity, identified through DNA bar coding and other laboratory techniques. The complex question relates to how chemical waste impacts the evolution of living organisms through genetic mutations.

1. Which general learning outcomes of an interdisciplinary course does this course address?
Please explain how the course will fulfill the bolded mandatory learning outcome below. In addition, select and explain at least three additional outcomes.

🞎X **Purposefully connect and integrate across-discipline knowledge and skills to solve problems**

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|  Students will make connections to fundamental concepts across the life sciences and physical sciences. They will Identify and apply the basic principles of mathematics, biology, and chemistry, as they relate to the environment |

🞎X **Synthesize and transfer knowledge across disciplinary boundaries**

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| This project requires skills and knowledge in both biology and the chemical sciences. Students will learn about the historical use of Newton Creek for discharging industrial waste, its continued impact on the environment decades later, and how modern biological technicquest can be used to document this impact. This can lead to a wealth of rich discussion related to environmental justince, etc.  |

🞎X Comprehend factors inherent in complex problems

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| Environmental pollution and its impact on life is a complex problem. Students will apply the scientific method to explore natural phenomena, including hypothesis development, observation, experimentation, measurement, data analysis, and data presentation. |

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| 🞎X Students will apply integrative thinking to problem solving in ethically and socially responsible ways, use the tools of a scientific discipline to carry out collaborative laboratory investigations, and gather, analyze, and interpret data and present it as an oral presentation and poster..  |

🞎 Recognize varied perspectives

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| Students will identify and apply research ethics and unbiased assessment in gathering and reporting scientific data. |

🞎 Gain comfort with complexity and uncertainty

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| Students will learn to use a variety of analytical tools and apply these skills to conduct an independent research project examining biodiversity in Newtown Creek, a designated Superfund site along the Brooklyn-Queens border. |

🞎 XThink critically, communicate effectively, and work collaboratively

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| Students will work together and create and present posters of their findings. The will also make an oral presentation as part of the course  |

🞎X Become flexible thinkers

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| Students will apply integrative thinking to problem solving in ethically and socially responsible ways, use the tools of scientific disciplines to carry out collaborative laboratory investigations, and gather, analyze, and interpret data and present it. They will develop their own research question and study it. |

🞎 Other

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**General Education Learning Goals for City Tech Students**

* **Knowledge:** Develop knowledge from a range of disciplinary perspectives, and hone the ability to deepen and continue learning.
* **Skills:** Acquire and use the tools needed for communication, inquiry, creativity, analysis, and productive work.
* **Integration**: Work productively within and across disciplines.
* **Values, Ethics, and Relationships**: Understand and apply values, ethics, and diverse
perspectives in personal, professional, civic, and cultural/global domains.
1. How does this course address the general education learning goals for City Tech students?

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| All of the above learning goals are addressed**CUNY Pathways (Life and Physical Sciences) and Discipline Specific Learning Outcomes**

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| **LEARNING OUTCOMES** | **ASSESSMENT** |
| Identify and apply the fundamental concepts and methods of a life or physical science. | Make connections to fundamental concepts in project proposal and presentation. |
| Apply the scientific method to explore natural phenomena, including hypothesis development, observation, experimentation, measurement, data analysis, and data presentation. | Develop a reasonable research project proposal and successfully implement. |
| Use the tools of a scientific discipline to carry out collaborative laboratory investigations | Successful field collection, biochemical procedures, and bioinformatics analysis |
| Gather, analyze, and interpret data and present it in an effective written laboratory or fieldwork report. | Successful research project implementation and presentation. |
| Identify and apply research ethics and unbiased assessment in gathering and reporting scientific data. | Successful research project proposal development, implementation, and presentation. |

**General Education Learning Outcomes**

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| **LEARNING OUTCOMES** | **ASSESSMENT** |
| Identify and apply the basic principles of mathematics, physics, biology, chemistry, and engineering as they relate to the environment at an introductory level | Incorporate cross-disciplinary ideas into research project proposal and presentation. |
| Apply the scientific method to explore environmental issues. | Conduct a research project on Newtown Creek, a Superfund pollution site in rehabilitation. |
| Gather, analyze, visualize, and interpret data. | Successful field collection, biochemical procedures, and bioinformatics analysis |
| Participate effectively in a multi-disciplinary team environment. | Collaborative, critique, and present research projects. |

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| Apply the scientific method to explore environmental issues. | Conduct a research project on Newtown Creek, a Superfund pollution site in rehabilitation. |
| Gather, analyze, visualize, and interpret data. | Successful field collection, biochemical procedures, and bioinformatics analysis |
| Participate effectively in a multi-disciplinary team environment. | Collaborative, critique, and present research projects. |

1. Which department would house this course[[3]](#footnote-3)? Eventually Chemistry and/or Biology, currently an Independent Study course.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
Would all sections of the course be interdisciplinary? 🞎 No X🞎 Yes
	1. Would the course be cross-listed in two or more departments? 🞎 No 🞎 Yes
	Explain.

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| To be determined. |

* 1. How will the course be team-taught[[4]](#footnote-4)? 🞎X Co-taught 🞎 Guest lecturers 🞎 Learning community

	If co-taught, what is the proposed workload hour distribution? \_\_\_50% each\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	🞎X Shared credits 🞎 Trading credits
	If guest lecturers, for what approximate percentage of the course? 🞎 Minimum 20%[[5]](#footnote-5) 🞎 other: \_\_%

	Please attach the evaluation framework used to assess the interdisciplinarity of the course.[[6]](#footnote-6)
	2. What strategies/resources would be implemented to facilitate students’ ability to make connections across the respective academic disciplines?

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| Analytical skills will be taught by a biologist..Chemist will oversee sampling and documentation and provide historical context, and background on topics such as the benzene ring.. Both faculty will support research project development. |
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1. Would the course be designated as:

🞎X a College Option requirement[[7]](#footnote-7)? 🞎 an elective? 🞎 a Capstone course[[8]](#footnote-8)? 🞎 other? Explain.

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| Interdisiplinary course |

**Interdisciplinary Course Evaluation Framework**

**CUNY Pathways (Life and Physical Sciences) and Discipline Specific Learning Outcomes**

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| **LEARNING OUTCOMES** | **ASSESSMENT** |
| Identify and apply the fundamental concepts and methods of a life or physical science. | Make connections to fundamental concepts in project proposal and presentation. |
| Apply the scientific method to explore natural phenomena, including hypothesis development, observation, experimentation, measurement, data analysis, and data presentation. | Develop a reasonable research project proposal and successfully implement. |
| Use the tools of a scientific discipline to carry out collaborative laboratory investigations | Successful field collection, biochemical procedures, and bioinformatics analysis |
| Gather, analyze, and interpret data and present it in an effective written laboratory or fieldwork report. | Successful research project implementation and presentation. |
| Identify and apply research ethics and unbiased assessment in gathering and reporting scientific data. | Successful research project proposal development, implementation, and presentation. |

**General Education Learning Outcomes**

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| **LEARNING OUTCOMES** | **ASSESSMENT** |
| Identify and apply the basic principles of mathematics, physics, biology, chemistry, and engineering as they relate to the environment at an introductory level | Incorporate cross-disciplinary ideas into research project proposal and presentation. |
| Apply the scientific method to explore environmental issues. | Conduct a research project on Newtown Creek, a Superfund pollution site in rehabilitation. |
| Gather, analyze, visualize, and interpret data. | Successful field collection, biochemical procedures, and bioinformatics analysis |
| Participate effectively in a multi-disciplinary team environment. | Collaborative, critique, and present research projects. |

1. See “Application for Interdisciplinary Course Designation” question 9b for team-teaching options. [↑](#footnote-ref-1)
2. Exceptions are made for Departments that provide a home for multiple disciplines, such as Humanities and Social Science. [↑](#footnote-ref-2)
3. An interdisciplinary course for the College Option requirement may be housed in a department that is not liberal arts. [↑](#footnote-ref-3)
4. Attach evidence of consultation with all affected departments. [↑](#footnote-ref-4)
5. While an interdisciplinary course must be team-taught, there is no formal percentage requirement, but this minimum is a guideline. [↑](#footnote-ref-5)
6. In the case that a course is equally taught, include proposed plans for faculty classroom observation and student evaluation of teaching. [↑](#footnote-ref-6)
7. To qualify for the College Option, such a course must also meet the New York State definition of a liberal arts and sciences course.
<http://www.nysed.gov/college-university-evaluation/department-expectations-curriculum> [↑](#footnote-ref-7)
8. A course proposed as a Capstone course must be separately approved by the Capstone Experience Committee. [↑](#footnote-ref-8)