New York City College of Technology
Interdisciplinary Committee

Criteria for an Interdisciplinary Course

I. 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] by more than one faculty member from two or more departments[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

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[1] See "Application for Interdisciplinary Course Designation" question 9b for team-teaching options.

[2] Exceptions are made for Departments that provide a home for multiple disciplines, such as Humanities and Social Science.

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Application for Interdisciplinary Course Designation

Date 27 August 2015

Submitted by Alan Lovegreen & Oleg Berman

Department(s) English & Physics

II. Proposal to Offer an Interdisciplinary Course

1. Identify the course type and title: **English 2420: Science Fiction**

   X An existing course, English 2420

   ☐ A new course _____

   ☐ A course under development _____

2. Provide a course description

This interdisciplinary course examines science fiction texts from a physics perspective, focusing on both the long and short-term ability of science fiction to inspire and give ethical boundaries to otherwise abstract modeling of theoretical physics. In turn, the course will also demonstrate how physics historically informed the development of science fiction and culture. Significant themes and trends in the futuristic worlds of science fiction, such as airlocks, nanotechnology, the production and use of gravity wells, and planetary centrifugal force, will be discussed alongside the ways that private industry, government, and global scientific communities approach the ethics of envisioning the future.

3. How many credits will the course comprise? **3** How many hours? **3**

4. What prerequisite(s) would students need to complete before registering for the course? Co-requisite(s)?

   Prerequisites: ENG 1101

5. Explain briefly why this is an interdisciplinary course.

   Essentially all methods of futurism, which include diverse spheres of influence from futures markets (financial exchanges), environmental models (weather & climate), and science fiction texts and films, rely on abstract thought. Students will learn basic physics equations, and then use these skills to enhance their knowledge of the mechanisms that drive some of the most well known technological concerns in classic and contemporary tales of science fiction. While the

discipline and chronological parsing of science fiction serves as the organizational logic to the course, the instructors also will discuss perspectives that are often sequestered in biological sciences, industrial design technology, and mechanical engineering technology, as well as ethics and social sciences.

6. 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?

   This course offers the unique opportunity to investigate the vibrant reciprocal relationship between two speculative discourses: science fiction and theoretical physics. The prescience of the works of Jules Verne, H.G. Wells, and other prominent literary figures in science fiction provided the inspiration for some of the most interesting developments in theoretical physics; in turn, cutting-edge physics has often inspired authors to generate innovative narratives and themes related to an emerging technoculture. This course will apply a careful, formula-based scientific method to the extrapolations of literary texts, which will complement the literary, new historical approach to the texts' questions about humans, technology, and imagining the future.

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7. 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**

   Students will learn how to describe challenges of theoretical work in its pure, abstract form by situating both literary themes and physical models within the narrative structure of science fiction culture. They will encounter a broad spectrum of concerns that neither science fiction nor physics can adequately – and responsibly – speak to without an integrated approach. Students will practice making predictions patterned after the equations and technical challenges of the texts to demonstrate similar abilities of extrapolation.

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

   Students will be exposed to science fiction narratives that co-opt complex engineering challenges and abstract physics-based modeling in order to convey ethical, social, and/or political dimensions (to name a few) that might otherwise be lost in the heady pursuit of advancing "science."

   ☐ Comprehend factors inherent in complex problems

   X Apply integrative thinking to problem solving in ethically and socially responsible ways

   Students in this class will learn to question not only whether the science behind science fiction is honest and accurate, but also whether the technologies depicted allow for an improved

future where such innovations can solve ethical and social problems. Upon successfully completing the course, students will also be able to recognize and critically evaluate the widespread historical model of technological determinism (the idea that new technology is simply developed and that culture responds).

☐ Recognize varied perspectives

X Gain comfort with complexity and uncertainty

This course will give students the tools to interrogate the complex nature of predicting and ethically supporting the modeling of the future, and also give them the ability to critically explain the limitations and consequences of speculative work. The integration of scientific methodology with literary studies will produce thinkers capable of applying organizational principles to narratives.

X Think critically, communicate effectively, and work collaboratively

The collaborative group presentation in this course will demonstrate peer-to-peer learning, clear communication through oral and visual presentation, and the evaluation of each other's work. Working in teams, students will learn how to perform research as a team, and how to identify leadership roles within their groups.

☐ Become flexible thinkers

☐ Other

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.

8. How does this course address the general education learning goals for City Tech students?

Knowledge

The course develops an understanding of how technology and scientific communities are interrelated to the long-term trajectories of the arts and science. Students will understand the

rich history of scientific study and theoretical science that provoked classic science fiction, and be able to identify similar patterns in their own fields of study.

Skills
Students will be able to narrativize basic physics equations, and in turn use theoretical models to discuss fiction, skills that demonstrate the feedback loop inherent in the speculative engineering of the future. Students will be able to lucidly describe how current and past technological developments are closely related to the science fiction elements of theoretical physics. They shall also learn and refine their ability to discuss and analyze such relationships orally and in writing.

Integration
Student will be able to apply the tools acquired from physics and science fiction narratives to understand how mechanisms such as *novum* (the way that not-yet-material ideas rely on a type of cognitive disruption in order to inspire new ways of thinking) can . The course's integration of popular science fiction ideas and formula-driven extrapolation demonstrate the most fruitful outcomes of interdisciplinary study.

Values, Ethics, and Relationships
Not only will students who successfully complete the course develop an understanding of how diverse the history of technological innovation is, they will also be empowered to carefully consider such narratives and theoretical methodologies as they emerge as intellectual citizens of tomorrow.

9. Which department would house this course[3]? **English**
   Would all sections of the course be interdisciplinary? **X** No ☐ Yes

   a) Would the course be cross-listed in two or more departments? **X** No ☐ Yes
      Explain.

      _____

      How will the course be team-taught[4]? **X Co-taught** ☐ Guest lecturers ☐ Learning community

      If co-taught, what is the proposed workload hour distribution? **50/50**
      ☐ Shared credits ☐ Trading credits
      If guest lecturers, for what approximate percentage of the course? ☐ Minimum 20%[5] ☐ other: __%

[3] An interdisciplinary course for the College Option requirement may be housed in a department that is not liberal arts.
[4] Attach evidence of consultation with all affected departments.
[5] While an interdisciplinary course must be team-taught, there is no formal percentage requirement, but this minimum is a guideline.

Please attach the evaluation framework used to assess the interdisciplinarity of the course.[6]

Evaluation Framework

The assignments in ENGL 2420 will allow students to:

1) Combine points of view from different disciplinares
2) Incorporate the methodology learned in the course into their own fields of study. For instance, students will begin to see how literature and the arts influence scientific research and theoretical modeling, and how extrapolation both affects the ways that today's citizens engage in forecasting the future and living in that future mindset.

Some of the assignments that will be used to assess the interdisciplinary productivity of the course include:

a.) A short essay and research proposal that illustrate the close relationship between speculative fiction and speculative science.
b.) A midterm and a final where students will propose solutions based on both narrative and technical problem-solving.
c.) A group research project and presentation. Teams shall select an influential work of science fiction (or work of science-fiction inspired futurism) and demonstrate how current theoretical physics are building upon such visions. Student teams will be evaluated using a rubric that, among other things, assesses their ability to incorporate several different disciplinary perspectives into their presentation.

b) What strategies/resources would be implemented to facilitate students' ability to make connections across the respective academic disciplines?

Students will apply the scientific method of generating a hypothesis to their critical readings of narratives. Additionally, the demonstrated application of theoretical physics modeling to technologies portrayed in the narratives will allow students to more accurately assess the importance of specific visions of the future. We will be incorporating a flipped classroom model at times, which will have students read science fiction, respond critically to the themes and technologies presented, and then learn and apply basic physics problems to their analyses.

10. Would the course be designated as:
☐ a College Option requirement[7]? **X** an elective? ☐ a Capstone course[8]? ☐ other? Explain.

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[6] In the case that a course is equally taught, include proposed plans for faculty classroom observation and student evaluation of teaching.
[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.highered.nysed.gov/ocue/lrp/liberalarts.htm
[8] A course proposed as a Capstone course must be separately approved by the Capstone Experience Committee.

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