**New York City College of Technology**

**Interdisciplinary Committee**

**Course Review Form**

**DATE:** February 23, 2018.

**REVIEWER:** Ezra Halleck

**COURSE TITLE & NUMBER:** Physics 2443: Modern Physics

**CREDIT HOURS:** 4 credits / 6 hours (3 lecture, 3 lab)

**PREREQUISITES:** Pre-requisite: PHYS 1442 or departmental permission

**COURSE IS:** 🗹 Existing New In development

**PROPOSED COURSE DESIGNATION**: 🗹 College Option 🗹 elective Capstone 🗹 other:

This course will satisfy the Interdisciplinary course requirement of the College Option component of City Tech’s general education.

**DEPARTMENT HOUSED IN:** Physics

**PROPOSED STRUCTURE (e.g., co-taught, guest lecture, LC, other):**  Guest lecturers.

**CREDIT DISTRIBUTION** (if co-taught): N/A

**CATALOG DESCRIPTION:**

Discoveries of 20th century physics caused numerous paradigm shifts, in science, philosophy, and society. Topics covered include quantum theory, including the wave/particle duality of light and particles and uncertainty principle, and the example of light diffraction and interference, relationship to quantum chemistry, quantum entanglement and relationship to quantum computing, lasers, holography, quantum mechanics of solids and application to electronics, the structure of the atom and the nucleus, including the basis of nuclear energy production, social implications of nuclear power, relativity and the nature of time, and astrophysics and the fate of the universe.

**DESCRIBE & EVALUATE HOW COURSE MEETS INTERDISCIPLINARY CRITERIA?**

The goal of this course is to understand the developments of physics during the 20th century and its relationship to technology, other sciences, and society. Steered by human beings, its presently dominant macro-species, our planet is travelling over some rough roads and, in its examination of nuclear weapons, the course will look at where one of these roads has taken us. As a counterbalance, the course provides some discussion of the positive such as quantum computing and the GPS. At the atomic level, quantities come in discrete units called quanta. Such quanta provide an explanation for the periodic chart, the basis of chemistry. They also enable already-mentioned quantum computing, potentially central to advanced computing this century. Lastly, the course will introduce some of the philosophical ramifications of quantum theory.

**DESCRIBE & EVALUATE THE INTERDISCIPLINARY STRUCTURE?**

The course will use guest lecturers from different disciplines including chemistry, philosophy, computer science and social science (history). These contributions will consist of more than 20% of the course lecture hours, the minimum requirement established by the Interdisciplinary Committee.

**DOES COURSE MEET REQUIREMENTS FOR GENERAL EDUCATION?**

Yes. This course emphasizes the understanding of physical concepts and their relationship to other disciplines. This is an area considered by the State of New York as belonging to liberal arts and sciences. Moreover, the course frequently challenges students to think about how physics concepts and research have impacted the development of and the conflicts within human society.

**STRENGTHS:** Modern (20th century) physics is the standard third semester course for physics majors across the country. However, this course has expansive laboratory and interdisciplinary components not often found in such courses. The course goes deep within its physics core while also incorporating both intellectually and societally important related material.

**WEAKNESSES:**

None.