**MORGAN STATE UNIVERSITY**

**\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_Computer Science Department\_\_\_\_\_\_\_\_\_\_\_\_**

*Name of academic unit*

**Curriculum Committee**

PROPOSAL FOR A COURSE

|  |
| --- |
| 1. **Course Number, Title and Number of Credits:**   **Course Number: COSC 210**  **Course Title: Quantum Mechanics for Computer Scientists**  **Number of Credit Hours: 3** |

|  |
| --- |
| **2. Number of Contact Hours:**  **Lecture: \_\_\_\_\_3\_\_\_\_\_\_\_ Laboratory \_\_\_\_\_\_0\_\_\_\_\_\_\_** |

|  |
| --- |
| 1. **Catalog Description:**   **COSC 210 Quantum Mechanics for Computer Scientists**  – *Three hours of lecture, 3 credits*. *One hour of lab.*  This course covers fundamental principles of quantum mechanics that are relevant to computer scientists. Concepts of quantum wave functions, uncertainty, superposition states and entanglement will be covered. Labs……  **Prerequisite:** None |

|  |
| --- |
| 1. **Course Objectives:**   Upon completion of this course, students will be able to do the following:   * **Describe** fundamental quantum mechanical principles * **Analyze** mathematical and experimental foundations of quantum mechanics * **Demonstrate** skills by solving quantum mechanics equations and conducting quantum-relevant experiments * **Analyze** the relationship between quantum states, quantum operators, and quantum computation |

|  |
| --- |
| 1. **Course Content:**   **Unit 0:** Review of classical physics  **Unit 1:** Blackbody radiation and Planck's hypothesis  **Unit 2:** Quantum wave-particle duality  **Unit 3:** Quantum Schroedinger equation (?)  **Unit 4:** Heisenberg uncertainty principle and ramifications  **Unit 5:** Quantum superposition and qubits  **Unit 6:** Quantum non-classical correlations  **Unit 7:** Quantum entanglement and quantum communication  **Unit 8:** Quantum no cloning theorem and quantum security  **Unit 9:** Quantum Bell states and teleportation  **Unit 10:** Quantum matrix approaches |
|  |

|  |
| --- |
| 1. **Relationship to Curriculum Sequence (Elective or Required; Need):**   This is an elective course for the BS in Computer Science program. |

|  |
| --- |
| 1. **Relationship to Similar Course Offerings in Other Departments:**   None. |

|  |
| --- |
| 1. **Bibliography:**   Course deliverables: lectures, notes, tutorials will be provided according to the topics covered.   * Quantum Mechanics for Beginners: With Applications to Quantum Communication and Quantum Computing. Suhail Zubairy. Oxford University Press. ISBN-13: 978-0198854234, 2020. * Quantum Physics for Beginners: The Complete Overview How to Easily Understand the All Principles of Quantum Mechanics in Everyday Life. James Philips. Springer. ISBN-13: ‎ 979-8883737823, 2024. |

**Note: A course outline and course syllabus must be submitted with this form.**

|  |
| --- |
| **Approved by: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  *Department Curriculum Chairperson Date*  **Approved by: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  *Department Chairperson Date*  **Approved by: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  *Chairperson, School Curriculum Committee Date*  **Approved by: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  *Dean/Director Date*  **Approved by: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  *Office of the Vice President for Academic Affairs Date* |