Intro. to Quantum Informatics
ECE 5383 001C
Electrical and Computer Engineering Department
Fall 2026

Instructor Information

Instructor: Mitchell Thornton
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Office Location: Junkins 328

Office Hours:
1:00-2:00PM on Mondays/Wednesdays or by email appointment

Preferred Method of Contact:
mitch@smu.edu

Course Details

Meeting Days/Times/Locations:

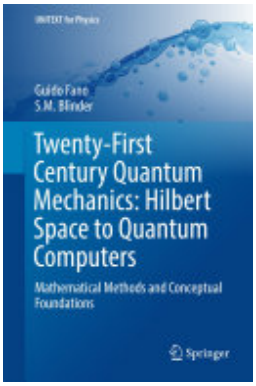
Start Date	End Date	Location	Meeting Day	Start Time	End Time
08/24/2026	12/08/2026	CARU0184	MW	02:00 PM	03:20 PM

Credit Hours: 3.00
Course Description: Quantum Informatics is the discipline concerned with methods to communicate, to sense, and to transform data represented in a unique way based on the properties of quantum mechanics. While the concept of quantum informatics is not new, the emergence and availability of useable technology is becoming more common. This class is designed to introduce engineering and computer science students to these topics as well as to provide a well-grounded introduction to implementation technology. No prior knowledge of quantum mechanics or quantum informatics is required for this class. Prerequisite: ECE 3381 or equivalent, introduction to undergraduate-level linear algebra, undergraduate university physics sequence, or consent of instructor.

Student Learning Outcomes

TOPICS - Introduction and contrast of quantum informatics to quantum mechanics - Review of Pertinent Topics in Linear and Tensor Algebra and Probability - Review of Pertinent Topics in Physics - Quantum Harmonic Oscillators - Hamiltonians and Schrödinger's Equation - Qubits, Qudits: Observables, Pure State Vectors, Superposition and Entanglement - Review of Pertinent Topics in Linear and Tensor Algebra and Probability - Projective Measurement - Review of Classical (Shannon) Information Theory - Discrete Variable (DV) Quantum Information - Reversibility and Quantum Operators/Gates - Superdense Coding; Teleportation; Quantum Key Distribution - Density Matrices and Mixed States - Quantum (Von Neuman) Information Theory - Introduction to DV Quantum Computation - Technological Implementations: Photonic, Superconducting Semiconductor and Ion Trap Qubits

Required Texts and Materials



Twenty-First Century Quantum Mechanics: Hilbert Space to Quantum Computers
ISBN: 9783319587325
Authors: Guido Fano, S M Blinder
Publisher: Springer
Publication Date: 2017-06-27

Selected papers and materials provided in class

Grading Policies/Grading Scale

EXAM 1	20%
EXAM 2	20%
Final EXAM	20%
Project	20%
Homework 1	5%
Homework 2	5%
Homework 3	5%
Homework 4	5%

Credit Hours by Activity

SMU defines a credit hour as the amount of work represented in the achievement of student learning outcomes that reasonably approximates one hour (50 minutes) of instruction and a minimum of two hours of out-of-class student work per week for each credit hour. The table below calculates estimates of this time investment.

Academic Activity	# of Acti...	X	Hours	Total Activity ...
Instructional Contact Hours	1	X	45	45
Exams	3	X	1.8	5.5
Homeworks	4	X	4	20
Project	1	X	20	20
Readings	10	X	4.5	45
		X		
		X		
All Activities		X	135.5	

Assignment Group Descriptions

In class discussions will occur.

Course Policies

COURSE CATALOG DESCRIPTION

An introduction for engineering and computer science students to quantum informatics, the discipline

concerned with methods to communicate, to sense, and to transform data represented in a unique way based on the properties of quantum mechanics. Also includes a well-grounded introduction to implementation technology. No prior knowledge of quantum mechanics or quantum informatics is required for this class. Prerequisite: ECE 3381 or equivalent, introduction to undergraduate-level linear algebra, undergraduate university physics sequence, or consent of instructor.

PREREQUISITES

ECE 3381 or equivalent, introduction to undergraduate-level linear algebra, undergraduate university calculus-based physics sequence, or consent of instructor.

Generative AI Policy

Generative AI may be used in this course. We will cover how Generative AI is used within this discipline, including how to navigate its potential uses and abuses, how and when to attribute sources, and other developing topics. When using Generative AI, follow these parameters:

- Take responsibility for the content (e.g., written and digital/interactive media assignments and projects). AI can produce content that contains inaccurate information, offensive language/images, and biased or unethical representations. What you submit is your responsibility across these dimensions.
- Do not enter private, sensitive, or copyrighted data from others into AI tools without their consent.
- Provide clear attribution of your sources. Any assignments that utilize Generative AI without attribution per the guidelines shared in this course can be seen as potential academic dishonesty and treated at the undergraduate level within the SMU Student Honor Code and at the graduate and professional level within the honor codes found in their respective school policies.

Title IX and Disability Accommodations

Disability Accommodations

Students who need academic accommodations for a disability must first register with Disability Accommodations & Success Strategies (DASS). Students can call 214-768-1470 or visit smu.edu/DASS to begin the process. Once they are registered and approved, students then submit a DASS Accommodation Letter through the electronic portal, *DASS Link*, and then communicate directly with each of their instructors to make appropriate arrangements. Please note that accommodations are not retroactive, but rather require advance notice in order to implement.

Sexual Harassment

All forms of sexual harassment, including sexual assault, dating violence, domestic violence and stalking, are violations of SMU's Title IX Sexual Harassment Policy and may also violate Texas law. Students who wish to file a complaint or to receive more information about the grievance process may contact Samantha Thomas, SMU's Title IX Coordinator, at accessequity@smu.edu or 214-768-3601. Please note that faculty and staff are mandatory reporters. If students notify faculty or staff of sexual harassment, they must report it to the Title IX Coordinator. For more information about sexual harassment, including resources available to assist students, please visit smu.edu/sexualharassment.

Pregnant Students

Students who are pregnant may request academic adjustments or work accommodations by contacting the Office of Student Advocacy and Support by calling 214-768-4564. Students seeking assistance must schedule an appointment with their professors as early as possible, present a letter from the Office of the Dean of Students, and make appropriate arrangements. Please note that academic adjustments are not retroactive and, when feasible, require advance notice to implement.

Academic Policies

Religious Observance

Religiously observant students wishing to be absent on holidays that require missing class should notify their professors in writing within the first two weeks of the semester and should discuss with them, in advance, acceptable ways of making up any work missed because of the absence. Click here for a list of holidays.

Medical-Related Absences

To ensure academic continuity and avoid any course penalties, students should follow procedures described by their instructors in order to be provided with appropriate modifications to assignments, deadlines, and exams.

Excused Absences for University Extracurricular Activities

Students participating in an officially sanctioned, scheduled university extracurricular activity should be given the opportunity to make up class assignments or other graded assignments that were missed as a result of their participation. It is the responsibility of the student to make arrangements for make-up work with the instructor prior to any missed scheduled examinations or other missed assignments. (See current Catalog under heading of "Academic Records/Excused Absences.")

Final Exams

Final course examinations shall be given in all courses where appropriate, and some form of final assessment is essential. Final exams and assessments must be administered as specified in the official examination schedule and cannot be administered or due during the last week of classes or during the Reading Period. Syllabi must state clearly the form of the final exam or assessment, and the due date and time must match the official SMU exam schedule. SMU policy states that all exceptions to the examination schedule may be made only upon written recommendation of the chair of the department sponsoring the course and with the concurrence of the dean of that school, who will allow exceptions only in accordance with guidelines from the Office of the Provost.

Academic Dishonesty

Students are expected to embrace and uphold the SMU Honor Code. Violations of the Honor Code will be acted upon in accordance with the policies and procedures outlined in the Mustang Student Handbook.

Generative AI Guidance

Every course must have a statement about classroom guidance around Generative AI. This syllabus statement builder has been provided to generate course-specific guidelines.

Zoom Use Guidelines

SACSCOC and university policy require that all in-person classes be taught in person and not moved to Zoom or other technology-mediated modalities, except for extenuating circumstances as laid out here.

Recording of Classes

Unauthorized student recording is prohibited. A full description of this policy can be found in SMU Policy 2.27 Audio/Video Recording in Academic Settings. Students who have approved accommodations for recording through the Disability Accommodations and Success Strategies (DASS) office do not need separate permission from the instructor to use those accommodations. Students are expected to communicate with their instructor early in the semester regarding how these accommodations will be implemented. Otherwise, all other uses of technologies for audio/video recording of lectures and other classroom activities are allowed only with the express prior permission of the instructor. This policy does not prohibit the use of SMU-approved instructional technologies to record class sessions for legitimate educational purposes when such recordings are authorized by the instructor and managed through institutionally supported technology systems, subject to applicable retention, access, and FERPA requirements. In cases where such recordings are allowed, content is restricted to Personal Use only, as defined in Policy Number 2.27, and the recording must not be shared beyond the class members without the written consent of all instructors and attendees who were recorded and must not be saved by students beyond the duration of the term.

Inclement Weather and Emergency Operations

In the event that SMU cancels classes due to inclement weather, we ask that you reference the following guidelines for further information.

Credit Hour Policy

In accordance with federal policy and SACSCOC standards, SMU defines a credit hour as the amount of work represented in the achievement of student learning outcomes that reasonably approximates one hour (50 minutes) of instruction and a minimum of two hours of out-of-class student work per week for each credit hour. Students should expect to spend at least three hours per week engaged in course-related work for each credit hour. Important Note: Shortened time frames (e.g., mod classes, intersessions classes, etc.) do not reduce total contact hour and expectations of time in student work outside of class. The same total hours must be delivered in a shorter timeframe through longer meetings or more intensive assignments. The following calculations hold true as a reflection of credit, regardless of the format of course delivery and include, but are not exhaustive of, the following: regular-term in-person; online/hybrid; laboratory; studio; internship/practicum /field experience; intersession/compressed term/course modules (A/B).

Student Support Services

Student Advising and Academic Success

Students needing assistance with writing assignments for SMU courses may schedule an appointment with the Writing Center through Writing Center Online. Students who would like support for subject-specific tutoring should access the tutor schedule. Students can schedule individual academic counseling sessions and attend learning strategies workshops on a variety of skills. This academic support is located on the 4th floor of the Blanton Student Services Building; 214-768-3648; smu.edu/a-lec and smu.edu/asd

Caring Community Connections Program

CCC is a resource for anyone in the SMU community to refer students of concern to the Office of the Dean of Students. The online referral form can be found at smu.edu/deanofstudentsccc. After a referral form is submitted, students will be contacted to discuss the concern, strategize options, and be connected to appropriate resources. Anyone who is unclear about what steps to take if they have concerns about students should contact the Office of the Dean of Students at 214-768-4564.

Mental Health Resources: Counseling Services and Teletherapy

Throughout the academic year, students may encounter different stressors or go through life experiences which impact their mental health and academic performance. Students who are in distress or have concerns about their mental health can schedule a same-day or next-day appointment to speak with a counselor by calling Counseling Services. Counselors are available at any time, day or night for students in crisis at this number: 214-768-2277 (then select option 2) They will be connected with a counselor immediately. Students seeking ongoing counseling should call the same number (214-768-2277, then select option 1) during normal business hours to schedule an initial appointment. SMU Teletherapy provides another free option for on-demand counseling and video appointments with a medical professional.

Campus Carry Law

In accordance with Texas Senate Bill 11, also known as the 'campus carry' law, and following consultation with entire University community, SMU chooses to remain a weapons-free campus. Specifically, SMU prohibits possession of weapons (either openly or in a concealed manner) on campus. For more information, please see: smu.edu/

campuscarrylaw.

Course Schedule

The Schedule for this class is available HERE.

(https://s2.smu.edu/~mitch/class/5383/schedule.html">https://s2.smu.edu/~mitch/class/5383/schedule.html)

Canvas Course Schedule

Due Date	Assignment	Type	Points
	EXAM1	Assignment	100
	EXAM2	Assignment	100
	EXAM3	Assignment	100
	HW3	Assignment	100
	HW4	Assignment	100
	HW5	Assignment	100
	PROJECT	Assignment	100
9/18/24	HW1	Assignment	100
10/2/24	HW2	Assignment	0