WYANT COLLEGE OF OPTICAL SCIENCES

QISE EMPHASIS REQUIREMENTS (version 2025.01.01)

MS Thesis option: 26 units of coursework + 6 units of OPTI 910: Thesis = 32 total units
MS Report option: 29 units of coursework + 3 units of OPTI 909: Report = 32 total units

* Total coursework units include Core and Approved Elective units (below) + 3 additional units of any graded OPTI coursework not listed below.
* With advisor and Associate Dean approval, up to 3 units of OPTI 599: Independent Study may be taken in place of the same number of units of Approved Electives.
* Courses listed as available online may require a minimum online enrollment to be offered as a distance course in any given semester.

CORE COURSES - COMPLETE AT LEAST 4 COURSES, ONE PER GROUP: 12 UNITS TOTAL	**Units**	**Term**	**Online?**	**Prereq**
OPTI 570 Quantum Mechanics *(or other graduate-level Quantum Mechanics course)*	3	F	yes	OPTI 511R or undergraduate quantum mechanics, or proficiency with linear algebra
OPTI 544 Foundations of Quantum Optics	3	S	yes	OPTI 570 or equiv
OPTI 646 Introduction to Quantum Information and Computation	3	F	yes	OPTI 570 or equiv. OPTI 544 recommended
or				
OPTI 647B Photonic Quantum Information Processing	3	S	yes	OPTI 570 and OPTI 657A recommended
OPTI 560 Quantum Nanophotonics	3	S	yes	E&M (OPTI 501 or equiv), intro. QM (OPTI 511R)
or				
OPTI 572 Quantum Photonic Integrated Circuits *(may not be offered every year). This course also counts as a lab class.*	3	S	yes	E&M (OPTI 501 or equiv), intro. QM (OPTI 511R)

APPROVED ELECTIVES - 11 UNITS FOR MS THESIS OPTION *OR* 14 UNITS FOR MS REPORT OPTION (includes minimum 2 units of lab courses)				
** Thesis and Report options allow for 3 units outside of the approved elective list to satisfy total coursework units requirements.*				
** With Facutly Advisor and Associate Dean approval, a student may use a suitable course in place of one of the approved electives in this list.*				
** Any units beyond 12 from courses in the Core Course list will count towards elective units*				
Elective lab courses - AT LEAST TWO LAB COURSES	**Units**	**Term**	**Online?**	**Prereq**
One lab may be waived for relevant industry experience (with Assoc. Dean approval)				
OPTI 511L Lasers and Solid-State Devices	1	F		OPTI 511R or other QM course; or 507 co-req
OPTI 571L Optical Physics Computational Laboratory	1	F	yes	OPTI 570 or equiv
OPTI 587L Photonics Communications Laboratory	1	S		
OPTI 572 Quantum Photonic Integrated Circuits	3	S	yes	E&M (OPTI 501 or equiv), intro. QM (OPTI 511R)
Approved Elective courses	**Units**	**Term**	**Online?**	**Prereq**
OPTI 501 Electromagnetic Waves	3	F	yes	
OPTI 503A Math Methods for Photonics and Optics	3	S	yes	
OPTI 507 Solid-state Optics	3	F		OPTI 511R, OPTI 570, or other QM course
OPTI 508 Probability and Statistics in Optics	3	S	yes	
OPTI 509 Statistical Optics	3	F		OPTI 501, OPTI 508
OPTI 511R Optical Physics and Lasers *(this course is a basic intro to quantum mechanics)*	3	S	yes	OPTI 501 preferred; linear algebra
OPTI 530 Optical Communications Systems *(aka Photonics Systems or Phot. Comm.)*	3	F	yes	
OPTI 539A From Photonics Innovation to Marketplace	3	S	yes	
OPTI 541A Introduction to Laser Physics *(Fall semesters are online only)*	1	F/S	yes	
OPTI 541B Laser Systems and Applications	1	F	yes	
OPTI 541C Ultrafast Optics	1	F	yes	
OPTI 553 Nonlinear Photonics	3	F	yes	OPTI 501 or equivalent
OPTI 596-004 Advanced Quantum Optics *(Course number TBD)*	3	F		OPTI 544
OPTI 596-006 Elements of Nonlinear Optics *(Course number TBD)*	3	S		OPTI 501
OPTI 595B Information in a Photon *(not offered every year)*	3		yes	complex numbers, probability, linear algebra
OPTI 600G Laser Beams and Resonators	1	S		OPTI 501
OPTI 600K Cavity Optomechanics I	1	S		OPTI 501. Rec: OPTI 570, OPTI 600G or OPTI 541A
OPTI 600L Cavity Optomechanics II	1	S		OPTI 600K
OPTI/ECE 632: Advanced Optical Communication Systems	3	S		OPTI 530 or equiv
OPTI 647A Photonic Gaussian Information *(same as OPTI 596-005 in Fall 2024)*	3	F		OPTI 570 or equiv
ECE 501B Linear Systems Theory	3	F	yes	
ECE 503 Probability and Random Processes	3	F	yes	
ECE 534 Advanced Topics in Optical and Electronic Materials *(not offered every year)*	3	S		
ECE 535A Digital Communications Systems I	3	S	yes	
ECE 536A Free-space Opt. Comm. Systems *(not offered every year)*	3		yes	
ECE 537 Digital Communications Systems II *(not offered every year)*	3	F		
ECE 540 Quantum Sensing and Quantum Machine Learning	3	F	yes	
ECE 543 Quantum Communications and Quantum Networks *(every other year)*	3	F	yes	
ECE 555 Intro to Quantum Mechanics and Quantum Information Processing	3	S		
ECE 571 Fundamentals of Information and Network Security	3	S	yes	
ECE 578 Fundamentals of Computer Networks	3		yes	
ECE 632 Advanced Opotical Communications Systems	3			
ECE 633 Q. Inf. Processing and Q. Error Correction *(not offered every year)*	3	F		
ECE 635 Error Correction *(not offered every year)*	3	F		
ECE 636 Inbformation Theory	3		yes	
ECE 639 Detection and Estimation in Engineering Systems	3	S	yes	
INFO 520 Ethical Issues in Information	3	F,S,Sum	yes	
LAW 695 Special topics in the law: The Past and Future Internet	3			see course catalog for details, availability
not currently offered:				
OPTI 510R Photonics	3	S	yes	basic E&M, OPTI 501 preferred