

# WYANT COLLEGE OF OPTICAL SCIENCES

## QISE EMPHASIS REQUIREMENTS (version 2023.10.22)

**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

<b>CORE COURSES - COMPLETE AT LEAST 4 COURSES, ONE PER GROUP: 12 UNITS TOTAL</b>	<b>Units</b>	<b>Term</b>	<b>Online?</b>	<b>Prereq</b>
OPTI 570 Quantum Mechanics ( <i>or other graduate-level Quantum Mechanics course</i> )	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
<i>or</i>				
OPTI 647 Photonic Quantum Information Processing ( <i>not offered S2024</i> )	3	S	yes	OPTI 570 or equiv
OPTI 560 Quantum Nanophotonics ( <i>not offered S2024</i> )	3	S	yes	E&M (OPTI 501 or equiv), intro. QM (OPTI 511R)
<i>or</i>				
OPTI 572 Quantum Photonic Integrated Circuits ( <i>was 596-001 for S2023 only</i> ) ( <i>This course also counts as a lab class</i> )	3	S	yes	E&M (OPTI 501 or equiv), intro. QM (OPTI 511R)

<b>APPROVED ELECTIVES - 11 UNITS FOR MS THESIS OPTION OR 14 UNITS FOR MS REPORT OPTION (includes minimum 2 units of lab courses)</b>
* <i>Thesis and Report options allow for 3 units outside of the approved elective list to satisfy total coursework units requirements.</i>
* <i>With Faculty Advisor and Associate Dean approval, a student may use a suitable course in place of one of the approved electives in this list.</i>
* <i>Any units beyond 12 from courses in the Core Course list will count towards elective units</i>

<b>Elective lab courses - AT LEAST TWO LAB COURSES</b>	<b>Units</b>	<b>Term</b>	<b>Online?</b>	<b>Prereq</b>
<i>One lab may be waived for relevant industry experience (with Assoc. Dean approval)</i>				
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	1	S		
OPTI 572 Quantum Photonic Integrated Circuits	3	S	yes	E&M (OPTI 501 or equiv), intro. QM (OPTI 511R)
<b>Approved Elective courses</b>	<b>Units</b>	<b>Term</b>	<b>Online?</b>	<b>Prereq</b>
OPTI 501 Electromagnetic Waves	3	F	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	S		OPTI 501, OPTI 508
OPTI 510R Photonics	3	S	yes	basic E&M, OPTI 501 preferred
OPTI 511R Optical Physics and Lasers ( <i>this course is an intro to quantum mechanics</i> )	3	S	yes	OPTI 501 preferred; linear algebra
OPTI 530 Optical Communications Systems	3	F	yes	
OPTI 539A From Photonics Innovation to Marketplace	3	S	yes	
OPTI 541A Introduction to Laser Physics ( <i>Fall semesters online only</i> )	1	F/S	yes	
OPTI 541B Laser Systems and Applications	1	F	yes	
OPTI 541B Ultrafast Optics	1	F	yes	
OPTI 553 Nonlinear Photonics	3	F	yes	OPTI 501 or equivalent
OPTI 595B Information in a Photon	3	S	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
OPTI 600L Cavity Optomechanics II	1	S		OPTI 501, OPTI 570, OPTI 600K
OPTI/ECE 632: Advanced Optical Communication Systems	3	S		OPTI 530 or equiv
OPTI 647 Photonic Quantum Information Processing	3	F	yes	OPTI 511R or OPTI 544
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 ( <i>not offered every year</i> )	3	S		
ECE 535A Digital Communications Systems I	3	S	yes	
ECE 536A Free-space Opt. Comm. Systems ( <i>not offered every year</i> )	3		yes	
ECE 537 Digital Communications Systems II ( <i>not offered every year</i> )	3	F		
ECE 540 Quantum Sensing and Quantum Machine Learning	3	F	yes	
ECE 543 Quantum Communications and Quantum Networks ( <i>every other year</i> )	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 Optical Communications Systems	3			
ECE 633 Q. Inf. Processing and Q. Error Correction ( <i>not offered every year</i> )	3	F		
ECE 635 Error Correction ( <i>not offered every year</i> )	3	F		
ECE 636 Information 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