

B.S. in Optical Sciences & Engineering

Catalog Year 2023-24

Below is the *advised sequence* of courses for this degree program as of 7/12/2022.

Official degree requirements and course prerequisites are found in the University General Catalog; prerequisites are subject to change.

Optics Track

Course Number and Title	Units	Prerequisites/Enrollment Requirements
1st Semester		
MATH 122A/B or MATH 125 Calculus I with Applications	5/3	Appropriate Math Placement
*CHEM 151 Chemical Thinking I or CHEM 161/163	4	Appropriate Math Placement
ENGL 101 or 107 or 109H First-Year Composition	3	
ENGR 102A/B Introduction to Engineering or ENGR 102	3	<u>ENGR102A</u> : MATH 112; <u>ENGR102B</u> : Concurrently enrolled or completion of MATH 122B or 125; FR & SOPH Status
UNIV 101 Intro to the General Education Experience	1	
Semester Total		16/14
2nd Semester		
MATH 129 Calculus II	3	MATH 122B or 125 with C or better
MSE 110 Solid State Chemistry	4	CHEM 151 or 161/163
*PHYS 141 Introductory Mechanics or PHYS 161H	4	MATH 122B or 125 or Appropriate Math Placement Level
ENGL 102 or 108 First-Year Composition	3	ENGL 101 or ENGL 107
General Education: Exploring Perspectives (Artist)	3	
Semester Total		17
3rd Semester		
OPTI 201R Geometrical & Instrumental Optics I (Fall Only)	3	MATH 122B or 125, Concurrent enrollment or completion of MATH 129
OPTI 201L Geometrical & Instrumental Optics Lab I (Fall Only)	1	Concurrent enrollment or completion of OPTI 201R
MATH 223 Vector Calculus	4	MATH 129 with a C or better
PHYS 241 Introductory Electricity and Magnetism or PHYS 261H	4	For PHYS 241 or 261H: PHYS 141 or 161H; MATH 129 or Appropriate Math Placement Level
Technical Elective	3	Consult major advisor for course approval
General Education: Exploring Perspectives (Social Scientist)	3	
Semester Total		18
4th Semester		
OPTI 202R Geometrical and Instrumental Optics II (Spring Only)	3	OPTI 201R
OPTI 202L Geometrical and Instrumental Optics Lab II (Spring Only)	1	Concurrent enrollment or completion of OPTI 202R
OPTI 280 Computer Programming (Spring Only)	1	
OPTI 210 Physics Optics I (Spring Only)	3	MATH 223. Completion of or concurrent enrollment in MATH 254, PHYS 241
MATH 254 Intro to Ordinary Differential Equations	3	MATH 129 or 223 with C or better
ECE 207 Elements of Electrical Engineering or ECE 220 Basic Circuits	3/5	<u>For ECE 207</u> : PHYS 241 or 261H; <u>For ECE 220</u> : MATH 129 and PHYS 241 or 261H
General Education: Exploring Perspectives (Humanist)	3	
Semester Total		17/19

*Each of the following foundational science courses satisfies the requirements for General Education: Exploring Perspectives (Natural Scientist): CHEM 151 or 152 or 161 or 162; or PHYS 141 or 161H.

Grade of 'C' or better is required for all OSE curriculum except General Education classes.

Optics Track

Advanced Standing is required for 300- and 400-level engineering courses (see your academic advisor for details).

Course Number and Title	Units	Comments
5th Semester		
OPTI 306 Radiometry, Sources and Detectors (Fall Only)	3	
OPTI 341 Semiconductor Physics & Lasers (Fall Only)	3	
OPTI 380A Intermediate Optics Laboratory I (Fall Only)	1	
MATH 322 Mathematical Analysis for Engineers	3	
Technical Elective	3	Consult major advisor for course approval
†General Education: Building Connections	3	
Semester Total	16	
6th Semester		
OPTI 330 Physical Optics II (Spring Only)	3	
OPTI 340 Optical Design (Spring Only)	3	
OPTI 370 Laser and Photonics (Spring Only)	3	
OPTI 380B Intermediate Optics Laboratory II (Spring Only)	1	
Technical Elective	3	Consult major advisor for course approval
†General Education: Building Connections	3	
Semester Total	16	
7th Semester		
ENGR 498A Interdisciplinary Capstone (Fall Only)	3	Senior Status
OPTI 421 Introductory Optomechanical Engineering (Fall Only)	3	
OPTI 430 Optical Communication Systems (Fall Only)	3	
OPTI 471A Advanced Optics Laboratory (Fall Only)	2	
Technical Elective	1	Consult major advisor for course approval
†General Education: Building Connections	3	
Semester Total	15	
8th Semester		
ENGR 498B Interdisciplinary Capstone (Spring Only)	3	Senior Status
OPTI 415 Optical Specifications, Fabrication and Testing (Spring Only)	3	
OPTI 471B Advanced Optics Laboratory (Spring Only)	2	
Technical Elective	3	Consult major advisor for course approval
Technical Elective	3	Consult major advisor for course approval
UNIV 301 General Education Portfolio	1	
Semester Total	15	

†Students should work closely with their academic advisor to select General Education: Building Connections courses; some course work in the major, such as some Technical Elective courses, may also fulfill General Education: Building Connections requirements.

Grade of 'C' or better is required for all OSE curriculum except General Education classes.

Opto-Materials Track

Course Number and Title	Units	Prerequisites/Enrollment Requirements
1st Semester		
MATH 122A/B or MATH 125 Calculus I with Applications	5/3	Appropriate Math Placement
*CHEM 151 Chemical Thinking I or CHEM 161/163	4	Appropriate Math Placement
ENGL 101 or 107 or 109H First-Year Composition	3	
ENGR 102A/B Introduction to Engineering or ENGR 102	3	<u>ENGR102A</u> : MATH 112; <u>ENGR102B</u> : Concurrently enrolled or completion of MATH 122B or 125; FR & SOPH Status
UNIV 101 Intro to the General Education Experience	1	
Semester Total	16/14	
2nd Semester		
MATH 129 Calculus II	3	MATH 122B or 125 with C or better
MSE 110 Solid State Chemistry	4	CHEM 151 or 161/163
*PHYS 141 Introductory Mechanics or PHYS 161H	4	MATH 122B or 125 or Appropriate Math Placement
ENGL 102 or 108 First-Year Composition	3	ENGL 101 or ENGL 107
General Education: Exploring Perspectives (Artist)	3	
Semester Total	17	
3rd Semester		
OPTI 201R Geometrical & Instrumental Optics I (Fall Only)	3	MATH 122B or 125, Concurrent enrollment or completion of MATH 129
OPTI 201L Geometrical & Instrumental Optics Lab I (Fall Only)	1	Concurrent enrollment or completion of OPTI 201R
MATH 223 Vector Calculus	4	MATH 129 with a C or better
PHYS 241 Introductory Electricity and Magnetism or PHYS 261H	4	For PHYS 241 or 261H: PHYS 141 or 161H; MATH 129 or Appropriate Math Placement Level
General Education: Exploring Perspectives (Humanist)	3	
†General Education: Building Connections	3	
Semester Total	18	
4th Semester		
OPTI 202R Geometrical and Instrumental Optics II (Spring Only)	3	OPTI 201R
OPTI 202L Geometrical and Instrumental Optics Lab II (Spring Only)	1	Concurrent enrollment or completion of OPTI 202R
OPTI 210 Physics Optics I (Spring Only)	3	MATH 223. Completion of or concurrent enrollment in MATH 254, PHYS 241
OPTI 280 Computer Programming (Spring Only)	1	
MATH 254 Intro to Ordinary Differential Equations	3	MATH 129 or 223 with C or better
ECE 207 Elements of Electrical Engineering or ECE 220 Basic Circuits	3/5	<u>For ECE 207</u> : PHYS 241 or 261H; <u>For ECE 220</u> : MATH 129 and PHYS 241 or 261H
General Education: Exploring Perspectives (Social Scientist)	3	
Semester Total	17/19	

*Each of the following foundational science courses satisfies the requirements for General Education: Exploring Perspectives (Natural Scientist): CHEM 151 or 152 or 161 or 162; or PHYS 141 or 161H.

Grade of 'C' or better is required for all OSE curriculum except General Education classes.

Opto-Materials Track

Advanced Standing is required for 300- and 400-level engineering courses (see your academic advisor for details).

Course Number and Title	Units	Comments
5th Semester		
OPTI 306 Radiometry, Sources and Detectors (Fall Only)	3	
OPTI 341 Semiconductor Physics & Lasers (Fall Only)	3	
OPTI 380A Intermediate Optics Laboratory I (Fall Only)	1	
MATH 322 Mathematical Analysis for Engineers	3	
ECE 207 Elements of Electrical Engineering or ECE 220 Basic Circuits	0	May be taken 4 th or 5 th Semester, Consult major advisor for course approval
MSE 365 Physical Properties of Materials (Fall Only)	3	
†General Education: Building Connections	3	
Semester Total	16	
6th Semester		
OPTI 330 Physical Optics II (Spring Only)	3	
OPTI 340 Optical Design (Spring Only)	3	
OPTI 370 Laser and Photonics (Spring Only)	3	
OPTI 380B Intermediate Optics Laboratory II (Spring Only)	1	
MSE 345 Thermodynamics (Spring Only)	4	
Semester Total	14	
7th Semester		
ENGR 498A Interdisciplinary Capstone (Fall Only)	3	Senior Status
OPTI 421 Introductory Optomechanical Engineering (Fall Only)	3	
OPTI 430 Optical Communication Systems (Fall Only)	3	
OPTI 471A Advanced Optics Laboratory (Fall Only)	2	
MSE 434 Electrical and Optical Properties of Materials (Fall only)	3	
General Education: Building Connections	3	
Semester Total	17	
8th Semester		
ENGR 498B Interdisciplinary Capstone (Spring Only)	3	Senior Status
OPTI 415 Optical Specifications, Fabrication, and Testing (Spring Only)	3	
OPTI 471B Advanced Optics Laboratory (Spring Only)	2	
MSE 480 Advanced Characterization Methods in Material Science and Engineering	3	
MSE Technical Elective	3	Consult major advisor for course approval
UNIV 301 General Education Portfolio	1	
Semester Total	15	

†Students should work closely with their academic advisor to select General Education: Building Connections courses; some course work in the major, such as some Technical Elective courses, may also fulfill General Education: Building Connections requirements.

Grade of 'C' or better is required for all OSE curriculum except General Education classes.

Opto-Electronics Track

Course Number and Title	Units	Prerequisites/Enrollment Requirements
1st Semester		
MATH 122A/B or MATH 125 Calculus I with Applications	5/3	Appropriate Math Placement
*CHEM 151 Chemical Thinking I or CHEM 161/163	4	Appropriate Math Placement
ENGL 101 or 107 or 109H First-Year Composition	3	
ENGR 102A/B Introduction to Engineering or ENGR 102	3	<u>ENGR102A</u> : MATH 112; <u>ENGR102B</u> : Concurrently enrolled or completion of MATH 122B or 125; FR & SOPH Status
UNIV 101 Intro to the General Education Experience	1	
Semester Total	16/14	
2nd Semester		
MATH 129 Calculus II	3	MATH 122B or 125 with C or better
MSE 110 Solid State Chemistry	4	CHEM 151 or 161/163
*PHYS 141 Introductory Mechanics or PHYS 161H	4	MATH 122B or 125 or Appropriate Math Placement
ENGL 102 or 108 First-Year Composition	3	ENGL 101 or ENGL 107
General Education: Exploring Perspectives (Artist)	3	
Semester Total	17	
3rd Semester		
OPTI 201R Geometrical & Instrumental Optics I (Fall Only)	3	MATH 122B or 125, Concurrent enrollment or completion of MATH 129
OPTI 201L Geometrical & Instrumental Optics Lab I (Fall Only)	1	Concurrent enrollment or completion of OPTI 201R
MATH 223 Vector Calculus	4	MATH 129 with a C or better
PHYS 241 Introductory Electricity and Magnetism or PHYS 261H	4	For PHYS 241 or 261H: PHYS 141 or 161H; MATH 129 or Appropriate Math Placement Level
ECE 175 Computer Programming for Engineering Applications	3	Concurrent enrollment or completion of MATH 122B or 125
†General Education: Building Connections	3	
Semester Total	18	
4th Semester		
OPTI 202R Geometrical and Instrumental Optics II (Spring Only)	3	OPTI 201R
OPTI 202L Geometrical and Instrumental Optics Lab II (Spring Only)	1	Prerequisite or concurrent enrollment in OPTI 202R
OPTI 210 Physics Optics I (Spring Only)	3	MATH 223, Completion of or concurrent enrollment in MATH 254, PHYS 241
OPTI 280 Computer Programming (Spring Only)	1	
MATH 254 Intro to Ordinary Differential Equations	3	MATH 129 or 223 with C or better
ECE 220 Basic Circuits	5	MATH 129 and PHYS 241 or 261H
General Education: Exploring Perspectives (Social Scientist)	3	
Semester Total	19	

*Each of the following foundational science courses satisfies the requirements for General Education: Exploring Perspectives (Natural Scientist): CHEM 151 or 152 or 161 or 162; or PHYS 141 or 161H.

Grade of 'C' or better is required for all OSE curriculum except General Education classes.

Opto-Electronics Track

Advanced Standing is required for 300- and 400-level engineering courses (see your academic advisor for details).

Course Number and Title	Units	Comments
5th Semester		
OPTI 306 Radiometry, Sources and Detectors (Fall Only)	3	
OPTI 341 Semiconductor Physics & Lasers (Fall Only)	3	
OPTI 380A Intermediate Optics Laboratory I (Fall Only)	1	
ECE 274A Digital Logic	4	
MATH 322 Mathematical Analysis for Engineers	3	
General Education: Exploring Perspectives (Humanist)	3	
Semester Total	17	
6th Semester		
OPTI 330 Physical Optics II (Spring Only)	3	
OPTI 340 Optical Design (Spring Only)	3	
OPTI 370 Laser and Photonics (Spring Only)	3	
OPTI 380B Intermediate Optics Laboratory II (Spring Only)	1	
ECE 381A Introductory Electromagnetics	4	
Semester Total	14	
7th Semester		
ENGR 498A Interdisciplinary Capstone (Fall Only)	3	Senior Status
OPTI 421 Introductory Optomechanical Engineering (Fall Only)	3	
OPTI 430 Optical Communication Systems (Fall Only)	3	
OPTI 471A Advanced Optics Laboratory (Fall Only)	2	
ECE Technical Elective	3	Consult major advisor for course approval
†General Education: Building Connections	3	
Semester Total	17	
8th Semester		
ENGR 498B Interdisciplinary Capstone (Spring Only)	3	Senior Status
OPTI 415 Optical Specifications, Fabrication, and Testing (Spring Only)	3	
OPTI 471B Advanced Optics Laboratory (Spring Only)	2	
†General Education: Building Connections	3	
UNIV 301 General Education Portfolio	1	
Semester Total	12	

†Students should work closely with their academic advisor to select General Education: Building Connections courses; some course work in the major, such as some Technical Elective courses, may also fulfill General Education: Building Connections requirements.

Grade of 'C' or better is required for all OSE curriculum except General Education classes.

Opto-Mechanics Track

Course Number and Title	Units	Prerequisites/Enrollment Requirements
1st Semester		
MATH 122A/B or MATH 125 Calculus I with Applications	5/3	Appropriate Math Placement
*CHEM 151 Chemical Thinking I or CHEM 161/163	4	Appropriate Math Placement
ENGL 101 or 107 or 109H First-Year Composition	3	
ENGR 102A/B Introduction to Engineering or ENGR 102	3	<u>ENGR102A</u> : MATH 112; <u>ENGR102B</u> : Concurrently enrolled or completion of MATH 122B or 125; FR & SOPH Status
UNIV 101 Intro to the General Education Experience	1	
Semester Total	16/14	
2nd Semester		
MATH 129 Calculus II	3	MATH 122B or 125 with C or better
MSE 110 Solid State Chemistry	4	CHEM 151 or 161/163
*PHYS 141 Introductory Mechanics or PHYS 161H	4	MATH 122B or 125 or Appropriate Math Placement Level
ENGL 102 or 108 First-Year Composition	3	ENGL 101 or ENGL 107
General Education: Exploring Perspectives (Artist)	3	
Semester Total	17	
3rd Semester		
OPTI 201R Geometrical & Instrumental Optics I (Fall Only)	3	MATH 122B or 125, Concurrent enrollment or completion of MATH 129
OPTI 201L Geometrical & Instrumental Optics Lab I (Fall Only)	1	Concurrent enrollment or completion of OPTI 201R
MATH 223 Vector Calculus	4	MATH 129 with a C or better
PHYS 241 Introductory Electricity and Magnetism or PHYS 261H	4	For PHYS 241 or 261H: PHYS 141 or 161H; MATH 129 or Appropriate Math Placement Level
CE 214 Statics	3	PHYS 141 or 161H; MATH 129
General Education: Exploring Perspectives (Humanist)	3	
Semester Total	18	
4th Semester		
OPTI 202R Geometrical and Instrumental Optics II (Spring Only)	3	OPTI 201R
OPTI 202L Geometrical and Instrumental Optics Lab II (Spring Only)	1	Prerequisite or concurrent enrollment in OPTI 202R
OPTI 210 Physics Optics I (Spring Only)	3	MATH 223, Completion of or concurrent enrollment in MATH 254, PHYS 241
OPTI 280 Computer Programming (Spring Only)	1	
MATH 254 Intro to Ordinary Differential Equations	3	MATH 129 or 223 with C or better
AME 250 Dynamics	3	CE 214; Concurrent enrollment or completion of MATH 254
General Education: Exploring Perspectives (Social Scientist)	3	
Semester Total	17	

*Each of the following foundational science courses satisfies the requirements for General Education: Exploring Perspectives (Natural Scientist): CHEM 151 or 152 or 161 or 162; or PHYS 141 or 161H.

Grade of 'C' or better is required for all OSE curriculum except General Education classes.

Opto-Mechanics Track

Advanced Standing is required for 300- and 400-level engineering courses (see your academic advisor for details).

Course Number and Title	Units	Comments
5th Semester		
OPTI 306 Radiometry, Sources and Detectors (Fall Only)	3	
OPTI 341 Semiconductor Physics & Lasers (Fall Only)	3	
OPTI 380A Intermediate Optics Laboratory I (Fall Only)	1	
ECE 207 Elements of Electrical Engineering or ECE 220 Basic Circuits	3/5	
MATH 322 Mathematical Analysis for Engineers	3	
AME 324A Mechanical Behavior of Engineering Materials	3	
Semester Total	16/18	
6th Semester		
OPTI 330 Physical Optics II (Spring Only)	3	
OPTI 340 Optical Design (Spring Only)	3	
OPTI 370 Laser and Photonics (Spring Only)	3	
OPTI 380B Intermediate Optics Laboratory II (Spring Only)	1	
AME 324B Engineering Component Design	3	
†General Education: Building Connections	3	
Semester Total	16	
7th Semester		
ENGR 498A Interdisciplinary Capstone (Fall Only)	3	Senior Status
OPTI 421 Introductory Optomechanical Engineering (Fall Only)	3	
OPTI 430 Optical Communication Systems (Fall Only)	3	
OPTI 471A Advanced Optics Laboratory (Fall Only)	2	
AME Technical Elective	3	Consult major advisor for course approval
†General Education: Building Connections	3	
Semester Total	17	
8th Semester		
ENGR 498B Interdisciplinary Capstone (Spring Only)	3	Senior Status
OPTI 415 Optical Specifications, Fabrication, and Testing (Spring Only)	3	
OPTI 471B Advanced Optics Laboratory (Spring Only)	2	
AME Technical Elective	1	Consult major advisor for course approval
†General Education: Building Connections	3	
UNIV 301 General Education Portfolio	1	
Semester Total	13	

†Students should work closely with their academic advisor to select General Education: Building Connections courses; some course work in the major, such as some Technical Elective courses, may also fulfill General Education: Building Connections requirements.

Grade of 'C' or better is required for all OSE curriculum except General Education classes.

Biomedical Optics Track

Course Number and Title	Units	Prerequisites/Enrollment Requirements
1st Semester		
MATH 122A/B or MATH 125 Calculus I with Applications	5/3	Appropriate Math Placement
*CHEM 151 Chemical Thinking I or CHEM 161/163	4	Appropriate Math Placement
ENGL 101 or 107 or 109H First-Year Composition	3	
ENGR 102A/B Introduction to Engineering or ENGR 102	3	<u>ENGR102A</u> : MATH 112; <u>ENGR102B</u> : Concurrently enrolled or completion of MATH 122B or 125; FR & SOPH Status
UNIV 101 Intro to the General Education Experience	1	
Semester Total	16/14	
2nd Semester		
MATH 129 Calculus II	3	MATH 122B or 125 with C or better
MSE 110 Solid State Chemistry	4	CHEM 151 or 161/163
*PHYS 141 Introductory Mechanics or PHYS 161H	4	MATH 122B or 125 or Appropriate Math Placement Level
ENGL 102 or 108 First-Year Composition	3	ENGL 101 or ENGL 107
General Education: Exploring Perspectives (Artist)	3	
Semester Total	17	
3rd Semester		
OPTI 201R Geometrical & Instrumental Optics I (Fall Only)	3	MATH 122B or 125, Concurrent enrollment or completion of MATH 129
OPTI 201L Geometrical & Instrumental Optics Lab I (Fall Only)	1	Concurrent enrollment or completion of OPTI 201R
MATH 223 Vector Calculus	4	MATH 129 with a C or better
PHYS 241 Introductory Electricity and Magnetism or PHYS 261H	4	For PHYS 241 or 261H: PHYS 141 or 161H; MATH 129 or Appropriate Math Placement Level
General Education: Exploring Perspectives (Humanist)	3	
†General Education: Building Connections	3	
Semester Total	18	
4th Semester		
OPTI 202R Geometrical and Instrumental Optics II (Spring Only)	3	OPTI 201R
OPTI 202L Geometrical and Instrumental Optics Lab II (Spring Only)	1	Prerequisite or concurrent enrollment in OPTI 202R
OPTI 210 Physics Optics I (Spring Only)	3	MATH 223, Completion of or concurrent enrollment in MATH 254, PHYS 241
OPTI 280 Computer Programming (Spring Only)	1	
MATH 254 Intro to Ordinary Differential Equations	3	MATH 129 or 223 with C or better
PSIO 201 Human Anatomy and Physiology I	4	
General Education: Exploring Perspectives (Social Scientist)	3	
Semester Total	18	

*Each of the following foundational science courses satisfies the requirements for General Education: Exploring Perspectives (Natural Scientist): CHEM 151 or 152 or 161 or 162; or PHYS 141 or 161H.

Grade of 'C' or better is required for all OSE curriculum except General Education classes.

Biomedical Optics Track

Advanced Standing is required for 300- and 400-level engineering courses (see your academic advisor for details).

Course Number and Title	Units	Comments
5th Semester		
OPTI 306 Radiometry, Sources and Detectors (Fall Only)	3	
OPTI 341 Semiconductor Physics & Lasers (Fall Only)	3	
OPTI 380A Intermediate Optics Laboratory I (Fall Only)	1	
ECE 207 Elements of Electrical Engineering or ECE 220 Basic Circuits	3/5	
MATH 322 Mathematical Analysis for Engineers	3	
Technical Elective	3	Consult major advisor for course approval
Semester Total	16/18	
6th Semester		
OPTI 330 Physical Optics II (Spring Only)	3	
OPTI 340 Optical Design (Spring Only)	3	
OPTI 370 Laser and Photonics (Spring Only)	3	
OPTI 380B Intermediate Optics Laboratory II (Spring Only)	1	
BME 330 Biomedical Instrumentation	4	
†General Education: Building Connections	3	
Semester Total	17	
7th Semester		
ENGR 498A Interdisciplinary Capstone (Fall Only)	3	Senior Status
OPTI 421 Introductory Optomechanical Engineering (Fall Only)	3	
OPTI 430 Optical Communication Systems (Fall Only)	3	
OPTI 471A Advanced Optics Laboratory (Fall Only)	2	
Technical Elective	2	Consult major advisor for course approval
†General Education: Building Connections	3	
Semester Total	16	
8th Semester		
ENGR 498B Interdisciplinary Capstone (Spring Only)	3	Senior Status
OPTI 415 Optical Specifications, Fabrication, and Testing (Spring Only)	3	
OPTI 471B Advanced Optics Laboratory (Spring Only)	2	
OPTI 420 Biophotonics	3	
UNIV 301 General Education Portfolio	1	
Semester Total	12	

†Students should work closely with their academic advisor to select General Education: Building Connections courses; some course work in the major, such as some Technical Elective courses, may also fulfill General Education: Building Connections requirements.

Grade of 'C' or better is required for all OSE curriculum except General Education classes.