

Bachelor of Science in Engineering Physics

The Engineering Physics program bridges the foundational knowledge contained in the conventional engineering and science programs to create an experience for students who want to learn at the forefront of technology. The program targets the developing fields of quantum technology, space flight, biomedical imaging, nanotechnology and beyond. Students enrolled in this program will be able to custom design a unique experience through a range of courses offered in the third and fourth years, with the unique opportunity afforded by design and experimentation courses offered throughout the program. Engineering Physics offers unique opportunities to work on projects with state-of-the-art technologies not only in the fourth-year capstone course, but through integrated experimental methods courses in the second and third year. Engineering Physics shows you what is possible today so that you are prepared to advance technology and push boundaries tomorrow.

YEAR 1	
FALL	WINTER
MATH 275: Calculus for Engineers & Scientists	MATH 277: Multivariable Calculus for Engineers and Scientists
MATH 211: Linear Methods 1	ENGG 202: Engineering Statics
ENGG 225: Fundamentals of Electrical Circuits and Machines	PHYS 259: Electricity and Magnetism
ENDG 233: Programming with Data	ENGG 201: Behaviour of Liquids/Gases/Solids
ENGG 204: Fundamentals of Engineering Materials	ENGG 200: Engineering Design, Innovation, and Entrepreneurship
Complementary Studies	
YEAR 2	
FALL	WINTER
PHEN 381: Continuum Mechanics 1*	PHEN 383: Continuum Mechanics 2*
MATH 375: Calculus for Engineers and Scientists	ENPH 301: Engineering Physics Research and Design 1*
ENGG 349: Dynamics	ENPH 388: Fundamentals of Circuits and Systems 1*
ENCM 335: Programming Fundamentals for Electrical Engineers	PHYS 229: Modern Physics
ENDG 319: Probability, Statistics, and Machine Learning	
Complementary Studies	



YEAR 3	
FALL	WINTER
ENPH 488: Fundamentals of Circuits and Systems 2*	ENPH 491: Multiphysics Design of Electromechanical Systems*
PHEN 435: Mathematical Methods for Engineering Physicists*	ENPH 401: Design for Engineering Physics 2*
PHYS 449: Statistical Mechanics 1 (Thermodynamics and Statistical Methods)	PHYS 443: Quantum Mechanics
ENEL 475: Electromagnetic Fields and Applications	Mechanical Engineering 485, 479, or 495; or Electrical Engineering 469, 471, or 476
	1 PHYS/ASPH Option/Elective
Complementary Studies	
YEAR 4	
FALL	WINTER
ENGG 501: Senior Capstone Design Project 1	ENGG 502: Senior Capstone Design Project 2
PHYS 375: Introduction to Optics and Waves	PHEN 501: Eng. Physics Research Project*
2 Approved Technical Electives	
1 Approved PHYS/ASPH Electives	
1 Approved Technical Elective or PHYS/ASPH Elective	
Complementary Studies	

Complementary Studies

Complementary Studies courses include:

- ENGG 213: Engineering Communication or COMS 363: Professional and Technical Communication
- ENGG 481: Technology and Society
- ENGG 513: Role and Responsibilities of the Prof. Engineer in Society
- SUSE 415: Eng. Econ. and Decision Making for Sustainability
- And two general complementary studies courses



Technical Options/Approved Electives (Electrical)

- ENEL 441: Control Systems
- ENEL 469: Analog Electronic Circuits
- ENEL 471: Introduction to Communications Systems and Networks
- ENEL 476: Electromagnetic Waves and Applications
- ENEL 503: Computer Vision
- ENEL 514: Intro to Nanotech
- ENEL 525: Machine Learning for Engineers
- ENEL 529: Wireless Communications Systems
- ENEL 541: Control Systems II
- ENEL 562: Photovoltaic Systems
- ENEL 563: Biomedical Signal Analysis
- ENEL 565: Digital Integrated Electronics
- ENEL 567: CMOS Analog Circuit Design
- ENEL 569: Electronic Systems and Applications
- ENEL 571: Digital Communications Systems
- ENEL 573: Computer Networks
- ENEL 574: Microwave Engineering
- ENEL 575: RF and Microwave Passive Circuits
- ENEL 582: Modeling and Control of Electric Machines and Drives
- ENEL 584: Power Systems for Buildings
- ENEL 586: Power System Protection
- ENEL 587: Power Systems Analysis
- ENEL 585: Intro to Power Electronics
- ENEL 593: Digital Filters
- ENEL 597: Power Systems Operations and Markets
- ENCM 467: Digital Electronics Circuits
- ENCM 509: Biometric Systems
- ENCM 517: Computer Arithmetic and Computational Complexity



Technical Options/Approved Electives (Mechanics)


- ENME 471: Heat Transfer
- ENME 479: Mechanics of Deformable Solids II
- ENME 495: Fluid Mechanics
- ENME 485: Mechanical Engineering Thermodynamics
- ENME 493: Machine Component Design
- ENME 505: Robotics
- ENME 547: Finite Element Method
- ENME 585: Control Systems
- ENME 587: Continuum Mechanics
- ENME 595: Gas Dynamics

Technical Options/Approved Electives (Biomedical)

- BMEN 509: Imaging
- BMEN 511: Biomaterials
- BMEN 515: Bioengineering Methods in Systems Biology and Physiology
- BMEN 523: Biomechanics of Movement
- BMEN 525: Biomechanics of Tissues

Technical Options/Approved Electives (Aerospace)

- ENEL 441: Control Systems 1
- ENGO 585: Wireless Location
- ENGO 623: Inertial Positioning and Gravimetry (*)
- ENME 519 (Special Topics): Aerodynamics
- ENME 521: Materials 2
- ENME 547: Finite Element Method
- ENME 595: Gas Dynamics

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- ENME 597: Turbomachinery
 - ENME 519.06 (Special topics): Aerodynamics
 - ENME 619.22 (Special Topics): Computational Fluid Dynamics (*)
 - ENME 619.XX: Propulsion
 - ENME 619.XX: Analysis of Advanced Materials
 - ENME 619.XX: Aeroelasticity
 - ENME 619.XX: Aerospace Fabrication

PHYS/ASPH 3XX/4XX/5XX Electives

- ASPH 305: Introduction to Astrophysics
- ASPH 307: Introduction to Observational Astrophysics
- ASPH 401: Galactic Astrophysics
- ASPH 403: Stellar Structure and Evolution
- ASPH 503: The Interstellar Medium
- ASPH 509: High Energy Astrophysics and Cosmology
- PHYS 451: Statistical Mechanics II
- PHYS 457: Electricity and Magnetism III
- PHYS 481: Computational Physics II
- PHYS 501: Relativity
- PHYS 507: Solid State Physics
- PHYS 509: Plasma Physics
- PHYS 521: Non-Linear Dynamics and Chaos
- PHYS 543: Quantum Mechanics II
- PHYS 561: Stable and Radioactive Isotopes
- PHYS 577: Implementations of Quantum Information
- PHYS 581: Computational Physics III

Samples of Areas of Focus for Engineering Physics students, with courses:

Quantum Science and Technology

Winter Year 3	Fall Year 4	Winter Year 4
PHYS 451: Statistical Mechanics III	PHYS 543: Quantum Mechanics II	PHYS 577: Implementations of Quantum Information
ENEL 471: Introduction to Comms Systems	ENEL 573: Computer Networks	ENCM 517: Computer Arithmetic and Computational Complexity
		ENEL 571: Digital Comms Sys

Aerospace

Winter Year 3	Fall Year 4	Winter Year 4
PHYS 457: Electricity and Magnetism III	ASPH 305: Intro to Astrophysics or PHYS 481: Computational Physics 2	PHYS 509: Plasma Physics
ENME 495: Fluid Mechanics	ENME 570: Aerodynamics	ENME 572: Computational Fluid Dynamics
		ENME 574: Propulsion

Computation

Winter Year 3	Fall Year 4	Winter Year 4
	PHYS 481: Computational Physics II	PHYS 581: Computational Physics III

ENCM 369: Computer Organization	ENME 574: Finite Element Method	ENME 572: Computational Fluid Dynamics
ENME 479: Mechanics of Solids II	ENME 495: Fluid Mechanics	

Materials

Winter Year 3	Fall Year 4	Winter Year 4
PHYS 451: Statistical Mechanics III	PHYS 507: Solid State Physics	PHYS 509: Plasma Physics
ENME 479: Mechanics of Solids II	ENME 495: Fluid Mechanics	ENME 521: Materials II
ENME 421: Materials I		

Questions? Contact us:

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