

# ENGINEERING PHYSICS, B.A.SC. (CLASS OF 2025)

## Second Year Core 2022-2023

Code	Title	Units
APSC 200	Engineering Design & Practice II	4.00
APSC 293	Engineering Communications	1.00
MTHE 227	Vector Analysis	3.00
MTHE 237	Differential Equations for Engineering Science	3.50
ENPH 242	Relativity And Quanta	3.50
ELEC 221	Electric Circuits	4.25
ENPH 211	Applied Physics	3.50
ENPH 239	Eng. Electricity & Magnetism	3.50
ENPH 253	Engineering Physics Laboratory	3.50
ENPH 213	Computational Eng. Physics	4.00
<b>Total Units</b>		<b>33.75</b>

## Electrical Sub-Plan (P1)

Code	Title	Units
Second Year Core		33.50
ELEC 252	Electronics I	4.25
ELEC 271	Digital Systems	4.00
MREN 223	Signals and Systems	4.00
<b>Total Units</b>		<b>45.75</b>

## Materials Sub-Plan (P3)

Code	Title	Units
Second Year Core		33.50
ENPH 225	Mechanics	3.50
MECH 270	Materials Science and Engineering	3.50
<b>Total Units</b>		<b>40.50</b>

## Mechanical Sub-Plan (P4)

Code	Title	Units
Second Year Core		33.50
ENPH 225	Mechanics	3.50
MREN 230	Thermodynamics and Heat Transfer	3.75
MREN 241	Fluid Mechanics and Fluid Power	3.75
<b>Total Units</b>		<b>44.50</b>

## Computing Sub-Plan (P6)

Code	Title	Units
Second Year Core		33.50
CMPE 212	Introduction to Computing Science II	4.00
ELEC 278	Fundamentals Of Information Structures	4.00

ENPH 225	Mechanics	3.50
<b>Total Units</b>		<b>45.00</b>

## Third Year Core 2023-2024

Code	Title	Units
ENPH 344	Intro. To Quantum Mechanics	3.50
ENPH 354	Engineering Physics Design Project	3.50
APSC 221	Economic And Business Practice	3.00
ENPH 345	Quantum Physics Of Atoms	3.50
ENPH 353	Engineering Physics Experiment Design	2.50
ENPH 316	Mathematical Methods in Physics I	3.50
<b>Total Units</b>		<b>19.50</b>

Notes:

\* ENPH 317 ([https://engineering\\_queensu.acalogadmin.com/preview/preview\\_program.php?catoid=10&progoid=599&preview#tt2358](https://engineering_queensu.acalogadmin.com/preview/preview_program.php?catoid=10&progoid=599&preview#tt2358)) can be taken in 3rd or 4th year and is a Physics List A elective.

\*\* Students are free to take Complementary Studies courses at any time in their program that suits their interests, workloads, and schedules. Read explanatory notes on Complementary Studies at the end of this section.

APSC 303 ([https://engineering\\_queensu.acalogadmin.com/preview/preview\\_program.php?catoid=10&progoid=599&preview#tt3957](https://engineering_queensu.acalogadmin.com/preview/preview_program.php?catoid=10&progoid=599&preview#tt3957)) may be taken as a List B technical elective for students that have successfully completed the internship program (QUIP).

APSC 381 ([https://engineering\\_queensu.acalogadmin.com/preview/preview\\_program.php?catoid=10&progoid=599&preview#tt1157](https://engineering_queensu.acalogadmin.com/preview/preview_program.php?catoid=10&progoid=599&preview#tt1157)) may be taken as a technical elective for students particularly interested in engineering design.

Physics list A electives ENPH 491 ([https://engineering\\_queensu.acalogadmin.com/preview/preview\\_program.php?catoid=10&progoid=599&preview#tt5963](https://engineering_queensu.acalogadmin.com/preview/preview_program.php?catoid=10&progoid=599&preview#tt5963)) and ENPH 495 ([https://engineering\\_queensu.acalogadmin.com/preview/preview\\_program.php?catoid=10&progoid=599&preview#tt6560](https://engineering_queensu.acalogadmin.com/preview/preview_program.php?catoid=10&progoid=599&preview#tt6560)) typically are not offered every year, thus students may want to consider adding them to their third year program.

Note: In the third year of the Engineering Physics program students may apply to the Accelerated Masters program. In this program, students work closely with a supervisor in the



summer after the third year of school doing research that leads towards a Masters degree in Physics or Engineering Physics. To accelerate students' progress towards a Masters degree, students take two graduate courses in their fourth year. These courses replace the Engineering Elective and a List "A" or List "B" course in the undergraduate program. Students enroll in ENPH 555 for their undergraduate thesis instead of ENPH 455. Students are admitted based on a minimum GPA of 3.7 and acceptance by a supervisor. Students are expected to finish their full Masters degree within 16 months after the undergraduate program, saving a year of time. For details see <http://queensu.ca/physics/undergrad-studies/accelerated-msc-masc>

### Electrical Sub-Plan (P1)

Code	Title	Units
Third Year Core		19.50
ELEC 353	Electronics II	4.25
ENPH 225	Mechanics	3.50
ENPH 336	Solid State Devices	3.25
ENPH 372	Thermodynamics	3.50
ELEC 326	Probability & Random Processes	3.50
<b>Total Units</b>		<b>37.50</b>

### Materials Sub-Plan (P3)

Code	Title	Units
Third Year Core		19.50
MECH 396	Mechanical and Materials Engineering Laboratory I	2.00
MECH 370	Prin Of Materials Processing	3.50
ENPH 334	Electronics For Applied Scient	5.00
ENPH 372	Thermodynamics	3.50
MECH 371	Fracture Mech & Dislocation	3.50
MECH 397	Mech And Material Eng Lab II	2.00
<b>Total Units</b>		<b>39.00</b>

### Mechanical Sub-Plan (P4)

Code	Title	Units
Third Year Core		19.50
ENPH 334	Electronics For Applied Scient	5.00
MECH 330	Applied Thermo II	3.50
MECH 341	Fluid Mechanics II	3.50
MECH 350	Automatic Control	3.50
Take a 300 or 400 level MECH course (MECH 333 excluded). Note, this does NOT count towards the 4th Year Mechanical List B choices.		
<b>Total Units</b>		<b>35.00</b>

### Computing Sub-Plan (P6)

Code	Title	Units
Third Year Core		19.50
ELEC 271	Digital Systems	4.00
ENPH 334	Electronics For Applied Scient	5.00
CMPE 320	Fndmnts Software Development	4.00
ELEC 274	Computer Architecture	4.00
ENPH 372	Thermodynamics	3.50
<b>Total Units</b>		<b>40.00</b>

### Fourth Year Core 2024-2025

Code	Title	Units
ENPH 431	Electromagnetic Theory	3.50
ENPH 453	Advanced Physics Laboratory	3.50
ENPH 454	Advanced Engineering Physics Design Project <sup>1</sup>	4.50
ENPH 455	Engineering Physics Thesis <sup>2</sup>	4.00
Engineering Elective (any 200- 300 or 400-level Engineering and Applied Science course)		3.00
<b>Total Units</b>		<b>18.50</b>

Notes:

\* Students may take ENPH 555 as an alternative to ENPH 455. ([https://engineering\\_queensu.acalogadmin.com/preview/preview\\_program.php?catoid=10&progoid=599&preview#tt7921](https://engineering_queensu.acalogadmin.com/preview/preview_program.php?catoid=10&progoid=599&preview#tt7921)) See the Notes regarding the Accelerated Masters program after the 3rd year program listing.

\*\* Students may instead take APSC 480 ([https://engineering\\_queensu.acalogadmin.com/preview/preview\\_program.php?catoid=10&progoid=599&preview#tt9542](https://engineering_queensu.acalogadmin.com/preview/preview_program.php?catoid=10&progoid=599&preview#tt9542)), Multi-disciplinary Industry Engineering Design Project (9 credits FW) as a substitute for ENPH 454 ([https://engineering\\_queensu.acalogadmin.com/preview/preview\\_program.php?catoid=10&progoid=599&preview#tt4381](https://engineering_queensu.acalogadmin.com/preview/preview_program.php?catoid=10&progoid=599&preview#tt4381)) and one list "B" course.

### Physics List A

One from Physics List A:

Code	Title	Units
ENPH 317	Mathematical Methods in Physics II	3.50
ENPH 321	Advanced Mechanics	3.50
ENPH 414	Introducation to General Relativity	3.00
ENPH 460	Laser Optics	3.50
ENPH 472	Statistical Mechanics	3.50

ENPH 479	High Performance Computational Physics	3.00
ENPH 480	Solid State Physics	3.50
ENPH 483	Nanoscience & Nanotechnology	3.50
ENPH 490	Nuclear And Particle Physics	3.50
ENPH 491	Physics Of Nuclear Reactors	3.50
ENPH 495	Intro To Medical Physics	3.00

### Electrical Sub-Plan (P1)

Two courses from Electrical List B, and one course from Electrical List B or Physics List A, at least one of which must be numbered above 400<sup>1</sup>.

#### Electrical List B

Code	Title	Units
ELEC 333	Electric Machines	4.25
ELEC 344	Sensors and Actuators	3.75
ELEC 373	Computer Networks	3.50
ELEC 408	Biomedical Signal and Image Processing	3.00
ELEC 409	Bioinformatic Analytics	3.00
ELEC 421	Digital Signal Processing: Filters and System Design	4.00
ELEC 422	Digital Signal Processing: Random Models and Applications	3.50
ELEC 431	Power Electronics	3.25
ELEC 443	Linear Control Systems	4.00
ELEC 448	Introduction To Robotics	3.50
ELEC 451	Digital Integrated Circuit Engineering	3.25
ELEC 454	Analog Electronics	3.25
ELEC 457	Integrated Circuits and System Application	3.50
ELEC 461	Digital Communications	3.50
ELEC 464	Wireless Communications	3.00
ELEC 483	Microwave and RF Circuits and Systems	4.25
ELEC 486	Fiber Optic Communication	3.75
CHEE 340	Biomedical Engineering	3.50
MREN 318	Sensors and Electric Actuators	4.25

<sup>1</sup> Students with the necessary prerequisites and/or permission of the instructor may replace a List B course above with a List B course from one of the other options within Engineering Physics.

Minimum Units: 36.5

### Materials Sub-Plan (P3)

Code	Title	Units
ENPH 480	Solid State Physics	3.50

#### Materials List B

Two courses from Materials List B<sup>1</sup>:

Code	Title	Units
MECH 423	Introduction To Microsystems	3.50
MECH 437	Fuel Cell Technology	3.50
MECH 470	Deformation Processing	3.50
MECH 476	Eng Of Polymers And Composite	3.50
MECH 478	Biomaterials	3.50
MECH 479	Nano-Structured Materials	3.50
MECH 483	Nuclear Materials	3.50
CHEE 340	Biomedical Engineering	3.50

<sup>1</sup> Students with the necessary prerequisites and/or permission of the instructor may replace a list B course above with a list B course from one of the other options within Engineering Physics.

Minimum Units: 38

### Mechanical Sub-Plan (P4)

Three courses: two from Mechanical List B, and one from Physics List A or Mechanical List B<sup>1</sup>:

#### Mechanical List B

Code	Title	Units
CHEE 340	Biomedical Engineering	3.50
MECH 420	Vibrations	3.50
MECH 423	Introduction To Microsystems	3.50
MECH 424	Sustainable Product Design	3.50
MECH 430	Thermal Systems Design	4.00
MECH 435	Internal Combustion Engines	3.50
MECH 437	Fuel Cell Technology	3.50
MECH 439	Turbomachinery	3.50
MECH 441	Fluid Mechanics III	3.50
MECH 444	Computational Fluid Dynamics	3.50
MECH 448	Compressible Fluid Flow	3.50
MECH 452	Mechatronics Engineering	5.00
MECH 456	Introduction To Robotics	3.50
MECH 465	Computer Aided Design	3.50
MECH 480	Airplane Aerodynamics and Performance	3.50
MECH 481	Wind Energy	3.50
MECH 482	Noise Control	3.50
MECH 492	Biological Fluid Dynamics	3.50
MECH 495	Ergonomics And Design	3.50

<sup>1</sup> Students with the necessary prerequisites and/or permission of the instructor may replace a List B course above with a List B course from one of the other options within Engineering Physics.

Minimum Units: 37.5



## Computing Sub-Plan (P6)

Three courses: two from Computing List B and one from Physics List A or Computing List B. At least one of the Computing List B courses must be numbered above 400<sup>1</sup>:

### Computing List B

Code	Title	Units
CHEE 340	Biomedical Engineering	3.50
CMPE 330	Computer-Integrated Surgery	3.00
CMPE 365	Algorithms I	4.00
CMPE 452	Neural Networks and Genetic Algorithms	3.00
CMPE 454	Computer Graphics	3.00
CMPE 457	Image Processing & Computer	3.00
CMPE 458	Programming Language Processor	4.00
CMPE 472	Medical Informatics	3.00
ELEC 371	Microprocessor Interfacing and Embedded Systems	4.00
ELEC 374	Digital Systems Engineering	4.25
ELEC 377	Operating Systems	4.00
ELEC 408	Biomedical Signal and Image Processing	3.00
ELEC 409	Bioinformatic Analytics	3.00

<sup>1</sup> Students with the necessary prerequisites and/or permission of the instructor may replace a List B course above with a List B course from one of the other sub-plans within Engineering Physics.

Minimum Units: 39.5

## Complementary Studies

Refer to the Complementary Studies section of this calendar for details regarding the requirements for all Engineering programs. For the Engineering Physics Plan, the Engineering Economics course is APSC 221 Economic And Business Practice, and the Communications requirements are met through courses in the core plan.