

## Block view of the study programme

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### Block 1

#### Cours obligatoires du tronc commun

PHYS0974-1	<i>Materials physics and biophysics</i> - Maryse HOEBEKE, Alejandro SILHANEK	Q1	30	-	-	5
PHYS0930-1	<i>Atomic physics</i> - Thierry BASTIN, Peter SCHLAGHECK	Q1	30	-	-	5
PHYS0975-1	<i>Introduction to soft matter and complex systems</i> - Nicolas VANDEWALLE	Q1	30	-	-	5

#### Cours au choix du tronc commun

In agreement with the Jury, choose a subject among :

##### Basic course

SSTG0016-1	<i>Training sessions and personal work</i> (english language) - COLLÉGIALITÉ, ISLV	Q2	15	45	-	5
PHYS0983-1	<i>Seminars in advanced physics I</i> (english language) - <i>Materials physics and biophysics</i> - COLLÉGIALITÉ - <i>Atomic physics</i> - COLLÉGIALITÉ - <i>Physics of soft matter and complex systems</i> - COLLÉGIALITÉ	TA				4
			10	-	-	
			10	-	-	
			10	-	-	

Choisir en accord avec le Jury des cours pour un total de 36 crédits parmi :

##### Atomic and nuclear

PHYS0932-1	<i>Cold atoms and atomic clocks</i> - Thierry BASTIN <b>Corequisite :</b> PHYS0930-1 - Physique atomique	Q2	20	10	-	4
PHYS2027-2	<i>Ultracold atoms and Bose-Einstein condensates</i> - Peter SCHLAGHECK <b>Corequisite :</b> PHYS0930-1 - Physique atomique PHYS3021-1 - Mécanique quantique avancée	Q2	25	-	-	4
PHYS0235-2	<i>Quantum optics</i> - John MARTIN <b>Corequisite :</b> PHYS0930-1 - Physique atomique PHYS3021-1 - Mécanique quantique avancée	Q2	20	10	-	4
PHYS0949-1	<i>Atomic structures modelling</i> - Pascal QUINET <b>Corequisite :</b> PHYS0930-1 - Physique atomique	Q2	10	10	-	4
PHYS0941-2	<i>Theoretical physics : Nuclei and particles</i> - JeanRené CUDELL	Q1	30	-	-	4
PHYS3021-1	<i>Advanced quantum mechanics</i> - Thierry BASTIN, John MARTIN, Peter SCHLAGHECK	Q1	30	-	-	4
PHYS0997-1	<i>Quantum information and computation</i> (english language) - François DAMANET	Q1	30	-	-	4
PHYS3136-1	<i>Open quantum systems</i> (english language) - François DAMANET, John MARTIN - [10h Proj.] <b>Corequisite :</b> PHYS3021-1 - Mécanique quantique avancée PHYS0235-2 - Optique quantique	Q2	20	-	[+]	4

##### Soft Materials / Statistical Physics

PHYS0969-1	<i>Introduction to biophotonics</i> - Laurent DREESEN	Q2	20	10	-	4
PHYS0939-2	<i>Physics of non-linearities, chaos and fractals</i> - Nicolas VANDEWALLE <b>Corequisite :</b> PHYS0975-1 - Introduction à la matière molle et aux systèmes complexes	Q2	15	15	-	4
PHYS3020-1	<i>Discrete element method and soft materials</i> - Eric OPSOMER - [15h Proj.]	Q2	20	-	[+]	4

#### Materials / Solid State

PHYS3003-1	<i>Physics of functional oxides</i> (english language) - Philippe GHOSEZ <b>Corequisite :</b> PHYS0974-1 - Physique des matériaux et biophysique	Q1	20	10	-	4
PHYS3004-1	<i>Physics of nanomaterials</i> (english language) - JeanYves RATY <b>Corequisite :</b> PHYS0974-1 - Physique des matériaux et biophysique	Q2	20	10	-	4
PHYS3023-1	<i>Physics of magnetic materials</i> (english language) - Eric BOUSQUET <b>Corequisite :</b> PHYS0974-1 - Physique des matériaux et biophysique	Q2	20	10	-	4
PHYS0981-1	<i>Quantum modelling of materials properties</i> (english language) - Philippe GHOSEZ <b>Corequisite :</b> PHYS0974-1 - Physique des matériaux et biophysique	Q1	20	10	-	4
CHIM0202-2	<i>Physical Chemistry</i> - Christian DAMBLON, Bernard LEYH	Q2	30	-	-	4
PHYS0987-1	<i>Physics of materials for energy</i> (english language) - Ngoc Duy NGUYEN - [15h Proj.]	Q1	20	-	[+]	4
PHYS0988-1	<i>Intrinsic and induced topological properties of matter</i> (english language) - Bertrand DUPÉ	Q2	20	10	-	4

#### Quantum Physics and Relativity

PHYS2012-1	<i>Relativistic quantum mechanics and relativistic statistics</i> - Peter SCHLAGHECK	Q1	20	5	-	4
SPAT0012-1	<i>General relativity</i> (english language) - Guillaume MAHLER	Q1	30	10	-	4

#### Experimental Physics

PHYS0250-2	<i>Experimental statistical physics</i> - Stéphane DORBOLO <b>Corequisite :</b> PHYS0975-1 - Introduction à la matière molle et aux systèmes complexes	Q2	10	20	-	4
PHYS3019-1	<i>Techniques of experimental physics</i> - Geoffroy LUMAY	Q2	20	20	-	4
PHYS0943-1	<i>Spectroscopy of electronic paramagnetic resonance</i> - Maryse HOEBEKE <b>Corequisite :</b> PHYS0974-1 - Physique des matériaux et biophysique	Q2	15	15	-	4
PHYS0095-1	<i>The physics of accelerators and vacuum technologies</i> - David STRIVAY	Q2	10	10	-	4
PHYS0968-1	<i>Signal processing</i> - Alejandro SILHANEK	Q2	25	20	-	4
PHYS3037-1	<i>Nanofabrication : principles and techniques</i> (english language) - Ngoc Duy NGUYEN, Alejandro SILHANEK <b>Corequisite :</b> PHYS0974-1 - Physique des matériaux et biophysique	Q2	25	15	-	4
PHYS0999-1	<i>Digital creation in sciences</i> - Roland BILLEN, Valentin FISCHER, Pierre MATHONET, JeanChristophe MONBALIU, Eric PARMENTIER, Nicolas VANDEWALLE - [30h Proj.]	TA	10	-	[+]	5

#### Optics and Imaging

PHYS0942-3	<i>Ionising radiations and imaging</i> - Alain SERET	Q1	20	5	-	4
PHYS0938-1	<i>Physics and cultural heritage</i> - David STRIVAY	Q1	15	5	-	4
PHYS0048-2	<i>Coherent and incoherent optics</i> (english language) - <i>Coherent optics and lasers applications</i> - Serge HABRAKEN - <i>Laser physics</i> - Serge HABRAKEN	Q1		10 5	15 5	- -
PHYS0048-3	<i>Coherent and incoherent optics, Instrumental optics I</i> (english language) - Serge HABRAKEN	Q1	20	15	-	4
PHYS0128-1	<i>Magnetic Resonance Imaging - the Basics</i> (english language) -	Q1	15	-	[+]	2

LAMALLE - [3d FW]

#### Applied physics

INFO0939-1	<i>High performance scientific computing (english language) -</i> Christophe GEUZAINÉ - [20h Proj.]	Q1	30	15	[+]	<b>5</b>
MECA0470-1	<i>New methods in computational mechanics and physics (english language) -</i> Maarten ARNST, Eric BÉCHET, Ludovic NOELS - [40h Proj.]	Q2	20	-	[+]	<b>5</b>
ELEN0062-1	<i>Introduction to machine learning (english language) -</i> Pierre GEURTS, Louis WEHENKEL - [40h Proj.]	Q1	30	5	[+]	<b>6</b>

#### Didactics

PHYS0979-1	<i>Conceptual approach to basic physics -</i> Hervé CAPS, Maryse HOEBEKE	Q1	30	-	-	<b>4</b>
AESS0241-1	<i>Introduction to physics didactics -</i> Maryse HOEBEKE	Q1	20	-	-	<b>4</b>

[...] Up to 20 credits (or more, in agreement with the Jury) in the two blocks may also be chosen in another study field or institution

#### Course Medical Physics

PHYS0952-3	<i>Imaging through ionising radiation -</i> Alain SERET <b>Corequisite :</b> PHYS0990-1 - Dosimétrie PHYS0989-1 - Radiobiology	Q1	25	5	-	<b>4</b>
PHYS0989-1	<i>Radiobiology (english language) -</i> N... <b>Corequisite :</b> PHYS0990-1 - Dosimétrie PHYS0952-3 - Imagerie par radiations ionisantes	Q2	10	-	-	<b>2</b>
PHYS0990-1	<i>Dosimetry -</i> Véronique BAART, Luca PELLEGRINI <b>Corequisite :</b> PHYS0989-1 - Radiobiology PHYS0952-3 - Imagerie par radiations ionisantes	Q2	20	-	-	<b>3</b>
RADI2001-1	<i>Radioprotection: hygiene problems</i> <b>Corequisite :</b> PHYS0990-1 - Dosimétrie PHYS0989-1 - Radiobiology RADP0141-1 - Radioprotection BIOL0007-1 - Biologie tissulaire PHYS0952-3 - Imagerie par radiations ionisantes	Q1	15	-	-	<b>2</b>
BIOL0007-1	<i>Tissue biology -</i> Marc THIRY	Q1	15	25	-	<b>4</b>
PHYL0644-1	<i>Human Anatomy and Physiology</i>	Q2	30	-	-	<b>3</b>
ANAT0222-1	<i>Elements of Radiology -</i> Paul MEUNIER, Luaba TSHIBANDA, Christophe VALKENBORGH	Q1	10	5	-	<b>2</b>
CHIM0620-1	<i>Radiopharmaceutical Chemistry -</i> Thibault GENDRON	Q1	20	10	-	<b>3</b>
PHYS0128-1	<i>Magnetic Resonance Imaging - the Basics (english language) -</i> Laurent LAMALLE - [3d FW] <b>Corequisite :</b> PHYS0930-1 - Physique atomique	Q1	15	-	[+]	<b>2</b>
RADP0141-1	<i>Radioprotection</i> - Part a) <i>Radioprotection techniques and complements -</i> Véra PIRLET - Part b) <i>Legislation on radioprotection and the organisation of a radiotherapy, radiodiagnostic and nuclear medicine department -</i> Véra PIRLET	Q2	30	15	-	<b>6</b>
SSTG0041-1	<i>Placement in medical radiophysics -</i> Véronique BAART, Claire BERNARD, Alain SERET - [12d Internship] <b>Corequisite :</b>	Q2	2	-	[+]	<b>7</b>

PHYS0990-1 - Dosimétrie  
 PHYS0989-1 - Radiobiology  
 PHYS0952-3 - Imagerie par radiations ionisantes

STAT0420-1	<i>Biostatistics 2</i> - AnneFrançoise DONNEAU	Q1	15	15	-	<b>3</b>
PHYS0968-1	<i>Signal processing</i> - Alejandro SILHANEK	Q2	25	20	-	<b>4</b>

#### Block 2

#### Cours obligatoires de la finalité

AESS1222-1	<i>Special didactics in physics : course and exercises (1st part)</i> - Hervé CAPS, Maryse HOEBEKE <b>Corequisite :</b> PHYS0979-1 - Approche conceptuelle de la physique de base	Q1	40	-	-	<b>3</b>
AESS1223-1	<i>Special didactics in physics : placements (1st part)</i> - <i>Observation placements</i> - Hervé CAPS, Maryse HOEBEKE - [10h Internship] - <i>Teaching placements</i> - Hervé CAPS, Maryse HOEBEKE - [20h Internship] - <i>Reflexive practical work</i> - Hervé CAPS, Maryse HOEBEKE <b>Corequisite :</b> PHYS0979-1 - Approche conceptuelle de la physique de base	Q1	-	-	[+]	<b>3</b>
AESS2222-1	<i>Special didactics in physics : course and exercises (2nd part)</i> - Hervé CAPS, Maryse HOEBEKE	Q2	35	-	-	<b>4</b>
AESS2223-1	<i>Special didactics in physics : placements (2nd part)</i> - <i>Teaching placements</i> - Hervé CAPS, Maryse HOEBEKE - [20h Internship] - <i>Reflexive practical work</i> - Hervé CAPS, Maryse HOEBEKE - <i>Extra-scholar teaching activities</i> - Hervé CAPS, Maryse HOEBEKE	Q2	-	-	[+]	<b>5</b>
AESS0202-1	<i>General didactics: course and exercises ; observation placements ; reflexive practices</i> - Annick FAGNANT - [10h Internship]	TA	30	10	[+]	<b>4</b>
AESS0246-1	<i>Analysis of scholastic institutions and educational policies</i> - Annelise VOISIN	Q2	15	-	-	<b>1</b>
AESS0004-1	<i>Media education</i> - Jeremy HAMERS	Q1	15	-	-	<b>1</b>
AESS0248-1	<i>Elements of sociology of education</i> - JeanFrançois GUILLAUME	Q2	10	-	-	<b>1</b>
AESS0140-1	<i>Professional ethics and training to neutrality and citizenship</i> - Anne HERLA	Q2	25	-	-	<b>2</b>
AESS0143-1	<i>Educational Psychology of adolescents and young adults</i> - Annick FAGNANT	Q1	15	-	-	<b>2</b>
AESS0249-1	<i>Interdisciplinary seminar</i> - Annick FAGNANT	Q2	15	-	-	<b>1</b>
AESS0339-1	<i>Understand and manage the diversity of public schools</i> - Ariane BAYE	TA	10	15	-	<b>3</b>

#### Cours obligatoire du tronc commun

SMEM0028-1	<i>Final thesis</i> - COLLÉGIALITÉ	TA	-	-	-	<b>18</b>
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#### Cours au choix du tronc commun

In agreement with the Jury, choose a subject among :

##### Basic course

PHYS0984-1	<i>Seminars in advanced physics II (english language)</i> - <i>Materials physics and biophysics</i> - COLLÉGIALITÉ - <i>Atomic physics</i> - COLLÉGIALITÉ - <i>Physics of soft matter and complex systems</i> - COLLÉGIALITÉ <b>Prerequisite :</b> PHYS0983-1 - Séminaires de Physique avancée I	TA				<b>4</b>
			10	-	-	
			10	-	-	
			10	-	-	

Choisir en accord avec le Jury des cours non déjà choisis pour un total de 8 crédits parmi :

##### Atomic and nuclear

PHYS0932-1	<i>Cold atoms and atomic clocks</i> - Thierry BASTIN <b>Corequisite :</b>	Q2	20	10	-	<b>4</b>
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	PHYS0930-1 - Physique atomique						
PHYS2027-2	<i>Ultracold atoms and Bose-Einstein condensates</i> - Peter SCHLAGHECK <b>Corequisite :</b> PHYS0930-1 - Physique atomique PHYS3021-1 - Mécanique quantique avancée	Q2	25	-	-		4
PHYS0235-2	<i>Quantum optics</i> - John MARTIN <b>Corequisite :</b> PHYS0930-1 - Physique atomique PHYS3021-1 - Mécanique quantique avancée	Q2	20	10	-		4
PHYS0949-1	<i>Atomic structures modelling</i> - Pascal QUINET <b>Corequisite :</b> PHYS0930-1 - Physique atomique	Q2	10	10	-		4
PHYS0941-2	<i>Theoretical physics : Nuclei and particles</i> - JeanRené CUDELL	Q1	30	-	-		4
PHYS3021-1	<i>Advanced quantum mechanics</i> - Thierry BASTIN, John MARTIN, Peter SCHLAGHECK	Q1	30	-	-		4
PHYS0997-1	<i>Quantum information and computation (english language)</i> - François DAMANET	Q1	30	-	-		4
PHYS3136-1	<i>Open quantum systems (english language)</i> - François DAMANET, John MARTIN - [10h Proj.] <b>Corequisite :</b> PHYS3021-1 - Mécanique quantique avancée PHYS0235-2 - Optique quantique	Q2	20	-	[+]		4
<b>Soft Materials / Statistical Physics</b>							
PHYS0969-1	<i>Introduction to biophotonics</i> - Laurent DREESEN	Q2	20	10	-		4
PHYS0939-2	<i>Physics of non-linearities, chaos and fractals</i> - Nicolas VANDEWALLE <b>Corequisite :</b> PHYS0975-1 - Introduction à la matière molle et aux systèmes complexes	Q2	15	15	-		4
PHYS3020-1	<i>Discrete element method and soft materials</i> - Eric OPSOMER - [15h Proj.]	Q2	20	-	[+]		4
PHYS0948-1	<i>Microgravity</i> - Martial NOIRHOMME, Nicolas VANDEWALLE - [3d FW] <b>Corequisite :</b> PHYS0975-1 - Introduction à la matière molle et aux systèmes complexes	Q2	10	20	[+]		4
<b>Materials / Solid State</b>							
PHYS3003-1	<i>Physics of functional oxides (english language)</i> - Philippe GHOSEZ <b>Corequisite :</b> PHYS0974-1 - Physique des matériaux et biophysique	Q1	20	10	-		4
PHYS3004-1	<i>Physics of nanomaterials (english language)</i> - JeanYves RATY <b>Corequisite :</b> PHYS0974-1 - Physique des matériaux et biophysique	Q2	20	10	-		4
PHYS3023-1	<i>Physics of magnetic materials (english language)</i> - Eric BOUSQUET <b>Corequisite :</b> PHYS0974-1 - Physique des matériaux et biophysique	Q2	20	10	-		4
PHYS0981-1	<i>Quantum modelling of materials properties (english language)</i> - Philippe GHOSEZ <b>Corequisite :</b> PHYS0974-1 - Physique des matériaux et biophysique	Q1	20	10	-		4
CHIM0202-2	<i>Physical Chemistry</i> - Christian DAMBLON, Bernard LEYH	Q2	30	-	-		4
PHYS0987-1	<i>Physics of materials for energy (english language)</i> - Ngoc Duy NGUYEN - [15h Proj.]	Q1	20	-	[+]		4
PHYS0988-1	<i>Intrinsic and induced topological properties of matter (english language)</i> - Bertrand DUPÉ	Q2	20	10	-		4

#### Quantum Physics and Relativity

PHYS2012-1 *Relativistic quantum mechanics and relativistic statistics* - Peter SCHLAGHECK Q1 20 5 - 4

SPAT0012-1 *General relativity (english language)* - Guillaume MAHLER Q1 30 10 - 4

#### Experimental Physics

PHYS0250-2 *Experimental statistical physics* - Stéphane DORBOLO Q2 10 20 - 4

**Corequisite :**

PHYS0975-1 - Introduction à la matière molle et aux systèmes complexes

PHYS3019-1 *Techniques of experimental physics* - Geoffroy LUMAY Q2 20 20 - 4

PHYS0943-1 *Spectroscopy of electronic paramagnetic resonance* - Maryse HOEBEKE Q2 15 15 - 4

**Corequisite :**

PHYS0974-1 - Physique des matériaux et biophysique

PHYS0095-1 *The physics of accelerators and vacuum technologies* - David STRIVAY Q2 10 10 - 4

PHYS0968-1 *Signal processing* - Alejandro SILHANEK Q2 25 20 - 4

PHYS3037-1 *Nanofabrication : principles and techniques (english language)* - Ngoc Duy NGUYEN, Alejandro SILHANEK Q2 25 15 - 4

**Corequisite :**

PHYS0974-1 - Physique des matériaux et biophysique

PHYS0999-1 *Digital creation in sciences* - Roland BILLEN, Valentin FISCHER, Pierre MATHONET, JeanChristophe MONBALIU, Eric PARMENTIER, Nicolas VANDEWALLE - [30h Proj.] TA 10 - [+] 5

#### Optics and Imaging

PHYS0942-3 *Ionising radiations and imaging* - Alain SERET Q1 20 5 - 4

PHYS0938-1 *Physics and cultural heritage* - David STRIVAY Q1 15 5 - 4

PHYS0048-2 *Coherent and incoherent optics (english language)* Q1 4

- *Coherent optics and lasers applications* - Serge HABRAKEN 10 15 -

- *Laser physics* - Serge HABRAKEN 5 5 -

PHYS0048-3 *Coherent and incoherent optics, Instrumental optics I (english language)* - Serge HABRAKEN Q1 20 15 - 4

PHYS0128-1 *Magnetic Resonance Imaging - the Basics (english language)* - Laurent LAMALLE - [3d FW] Q1 15 - [+] 2

PHYS0125-3 *Instrumental optics II (english language)* - Serge HABRAKEN Q2 25 15 - 4

**Prerequisite :**

PHYS0048-3 - Coherent and incoherent optics

#### Applied physics

INFO0939-1 *High performance scientific computing (english language)* - Christophe GEUZAIN - [20h Proj.] Q1 30 15 [+] 5

MECA0470-1 *New methods in computational mechanics and physics (english language)* - Maarten ARNST, Eric BÉCHET, Ludovic NOELS - [40h Proj.] Q2 20 - [+] 5

ELEN0062-1 *Introduction to machine learning (english language)* - Pierre GEURTS, Louis WEHENKEL - [40h Proj.] Q1 30 5 [+] 6

#### Didactics

PHYS0979-1 *Conceptual approach to basic physics* - Hervé CAPS, Maryse HOEBEKE Q1 30 - - 4

AESS0241-1 *Introduction to physics didactics* - Maryse HOEBEKE Q1 20 - - 4

[...] Up to 20 credits (or more, in agreement with the Jury) in the two blocks may also be chosen in another study field or institution

#### Course Medical Physics

QUAL0722-1	<i>Safety and quality assurance</i> (english language) - Edmond STERPIN <b>Prerequisite :</b> SSTG0041-1 - Stages en radiophysique médicale	Q2	5	10	-	<b>2</b>
RADL0442-1	<i>Radiobiology and radiopathology elements</i> - Chantal HUMBLET, Philippe MARTINIVE <b>Prerequisite :</b> BIOL0007-1 - Biologie tissulaire PHYL0644-1 - Anatomie et physiologie humaines ANAT0222-1 - Eléments d'anatomie radiologique	Q1	40	20	-	<b>6</b>
PHYS2024-1	<i>Transfer and co-registration of medical images</i> - Mohamed Ali BAHRI	Q1	15	-	-	<b>2</b>
CHIM0621-2	<i>Production and application of radioelements</i> - Thibault GENDRON - [3d FW]	Q2	15	-	[+]	<b>2</b>

#### Bloc d'aménagement du programme de l'année

### Additional ECTS (max 15-60) Master in physics (120 ECTS)

#### Optional courses

The update course, worth a maximum of 60 credits, will be determined based on students' prior training.

[...] Between 15 and 60 ECTS of courses from "Bachelier en sciences physiques"