



PHYSICS

26517 - PHYSICS (2024-25)

General

Code: 26517

Lecturer responsible:

ABRIL SANCHEZ, ISABEL

Credits ECTS:	6,00
Theoretical credits:	1,36
Practical credits:	1,04
Distance-base hours:	3,60

Departments involved

- **Dept:** APPLIED PHYSICS
Area: APPLIED PHYSICS
Theoretical credits: 1,36
Practical credits: 1,04
This Dept. is responsible for the course.
This Dept. is responsible for the final mark record.
- **Dept:** PHYSICS, ENGINEERING SYSTEMS AND SIGNAL THEORY
Area: APPLIED PHYSICS
Theoretical credits: 0
Practical credits: 0

Study programmes where this course is taught

- [DEGREE IN BIOLOGY](#)

Course type: CORE (Year: 1)

Competencies and objectives

Course context for academic year 2024-25

The study of Physics in a Biology degree is fully justified since physical mechanisms are the underlying processes that govern every phenomena, including biological ones. Moreover, much of the instrumentation used in Biology comes from developments in physics. Therefore, it is of outmost importance that a future biologist acquires a basic understanding in Physics. It is also important for them to realize the role played by physics on biological processes and that understanding complex systems such as life requires of knowledge in many different fields.

On the other hand, problem solving, in this case in Physics, is an important element in any science. It helps develop critical thinking and creative ways of confronting problems, that can be of use for any other subject in their studies and later on, in their professional lives.

Course content (verified by ANECA in official undergraduate and Master's degrees) for academic year {0}

Generic Degree Course Competences

- **CG1** : Desenvolupar la capacitat d'anàlisi, síntesi i raonament crític.
- **CG3** : Resoldre problemes de manera efectiva.

Specific Competences:>>Theoretical

- **CE17** : Comprendre els principis de la termodinàmica i les seues aplicacions en bioenergètica.
- **CE2** : Relacionar els principis físics i químics de la biologia.
- **CE23** : Analitzar els components del medi físic (hídric, atmosfèric i terrestre) i les seues relacions amb el medi biòtic.

Specific Competences:>>Ability

- **CE31** : Reconèixer i implementar bones pràctiques científiques de mesura i experimentació.
- **CE35** : Interpretar les dades procedents d'observacions i mesuraments en el laboratori i camp.
- **CE36** : Elaborar, presentar i defensar informes científics i tècnics tant de manera escrita com oral davant d'una audiència.
- **CE37** : Saber cercar, analitzar, comprendre i redactar textos científics i tècnics.

Exclusive skill taught in this course

No data

Learning outcomes (Training objectives)

No data

Specific objectives stated by the academic staff for academic year 2024-25

The main objective in this class is to provide the students with concepts and technics in physics that are relevant to Biology, and to apply these ideas to different biological phenomena. In this way, the students will understand the importance of physics in many fields of Biology.

Problem solving will be one of the main focus of the class, so the student will have to think, solve and check the results of a set of problems, which will be useful in all their scientific activities. It is also important that the students learn about how to use different sources of information such as books or journals, both in paper and electronic, and that they learn about scientific instrumentation, as well as writing laboratory reports.

Content and bibliography

Content for academic year 2024-25

Syllabus

Ch1.- Biomechanics. Work and Energy.

- 1.1 General laws of motion.
- 1.2 Work and power.
- 1.3 Kinetic and potential energy. Energy Conservation.
- 1.4 Metabolic rate. Scaling laws.

Ch2.- Elastic properties of materials

- 2.1 Stress and Strain.
- 2.2 Elasticity in biological systems.
- 2.3 Allotropic laws. Scaling law.

Ch3.- Fluids

- 3.1 Static fluids. Archimedes principle.
- 3.2 Continuity equation.
- 3.3 Ideal fluids: Bernouilli equation. Biological consequences.
- 3.4 Viscosity. Poiseuille's law.
- 3.5 Circulatory system in humans.

Ch4.- Surface phenomena.

- 4.1 Surface tension.
- 4.2 Capillarity.
- 4.3 Laplace law. Pulmonary surfactants.
- 4.4 Ascension of sap in trees.

Ch5.- Waves. Light and sound.

- 5.1 Description of an oscillatory motion.
- 5.2 Sound waves.
- 5.3 Nature of light. Electromagnetic spectrum.
- 5.4 Reflection and refraction. Lenses. Image formation. Optical instruments.

Ch6.- Transport phenomena.

- 6.1 Particle diffusion. Osmosis.
- 6.2 Heat transport:
 - a.- Conduction
 - b.- Convection
 - c.- Radiation
- 6.3 Applications in Biology.

Ch7.- Bioelectromagnetism

- 7.1 Interaction between charged particles: Coulomb law.
- 7.2 Electric field, electric potential energy and potential difference.
- 7.3 Magnetism. Magnetic field.
- 7.4 Nervous impulse.

Ch8.- Radioactivity. Biological effects of ionizing radiation.

- 8.1 Radioactivity. Radioactive decay.
- 8.2 Radioisotopes in Biology. Carbon dating.
- 8.3 Interaction of radiation with matter.

8.4 Dosimetry. Physical dose and biological dose.

Related links

No data

Bibliography

Física para las ciencias de la vida

Author(s): Cromer, Alan H.

Issue: Barcelona : Reverté, 2001;

ISBN: 84-291-1808-X

Category: Básico

Física para las ciencias de la vida

Author(s): Cromer, Alan H.

Issue: Barcelona : Reverté, 2001;

ISBN: 84-291-1808-X

Category: Básico

Física de los procesos biológicos

Author(s): CUSSÓ, Fernando; LÓPEZ, Cayetano; VILLAR, Raul

Issue: Barcelona : Ariel, 2004;

ISBN: 84-344-8062-X

Category: Complementario

Physics in biology and medicine

Author(s): Davidovits, Paul

Issue: London : Academic Press, 2019;

ISBN: 978-0-12-813716-1

Category: Básico

Physics in biology and medicine

Author(s): Davidovits, Paul

Issue: London : Academic Press, 2019;

ISBN: 978-0-12-813716-1

Category: Básico

Physics in biology and medicine

Author(s): Davidovits, Paul

Issue: London : Academic Press, 2019;

ISBN: 978-0-12-813716-1

Category: Básico

Física conceptual, decimosegunda edición

Author(s): Hewitt, Paul G.

Issue: México : Pearson Educación, 2016;

ISBN: 978-607-32-3822-9 (libro e)

Category: Sin especificar

Física para ciencias de la vida

Author(s): Jou i Mirabent, David ; Llebot Rabagliati, Josep Enric

Issue: Madrid : McGraw-Hill Interamericana, 2009;

ISBN: 978-84-481-6803-2

Category: Básico

Física

Author(s): KANE, Joseph W. ; STERNHEIM, Morton M.

Issue: Barcelona [etc.] : Reverté, 1998;

ISBN: 84-291-4318-1

Category: Básico

Physics

Author(s): KANE, Joseph W. ; STERNHEIM, Morton M.

Issue: New York : Wiley and sons, 1988;

ISBN: 978-0-471-63845-2

Category: Sin especificar

Biofísica y física médica : problemas y ejercicios resueltos**Author(s):** Mozo Villarías, Ángel**Issue:** Barcelona : PPU, 1994;**ISBN:** 84-477-0420-3**Category:** Sin especificar**Physics of the life sciences****Author(s):** Newman, Jay**Issue:** New York : Springer, 2008;**ISBN:** 978-0-387-77258-5**Category:** Básico**Física para biología, medicina, veterinaria y farmacia****Author(s):** Ortúñoz Ortín, Miguel**Issue:** Barcelona : Crítica, 1996;**ISBN:** 84-7423-796-3**Category:** Básico**Mecánica de fluidos****Author(s):** Potter, Merle C.**Issue:** México : Cengage, 2015;**ISBN:** 978-607-519-450-9**Category:** Complementario**Mecánica de fluidos : una introducción física****Author(s):** SMITS, Alexander J.**Issue:** México DF : Alfaomega Grupo Editor, 2003;**ISBN:** 970-15-0784-3**Category:** Complementario

Física para las ciencias de la vida

Author(s): Ortúñoz Ortín, Miguel

Issue: Madrid : Tébar Flores, 2019;

ISBN: 978-84-7360-676-9

Category: Básico

Physics of physiological measurements. V.5. Comprehensive Biomedical Physics

Author(s): Brahme, Anders

Issue: Amsterdam : Elsevier, 2013;

ISBN: 1-4614-5176-0 (libro e.)

Category: Complementario

Radiation therapy physics and treatment optimization. V.9 Comprehensive Biomedical Physics

Author(s): Brahme, Anders (ed)

Issue: Amsterdam : Elsevier, 2014;

ISBN: 978-0-444-53632-7

Category: Complementario

Proton therapy physics

Author(s): Paganetti, Harald

Issue: Boca Raton : CRC Press, 2019;

ISBN: 978-1-138-62650-8

Category: Complementario

The life of a leaf

Author(s): VOGEL, Steven

Issue: Chicago : University of Chicago Press, 2012;

ISBN: 978-0-226-85939-2

Category: Complementario

Assessment

Assessment procedures and criteria 2024-25

We will call:

EF: Grade from the final exam (out of 10)

NL: Grade from the Laboratory (out of 10)

NCO: Grade from the tests/exams performed during the semester (out of 10)

NAC: Grade from the proposed activities. These activities could be the resolution of problems, summary of articles or online questionnaires (out of 10)

The final grade will be obtained in the following way:

$NF = \max(0.5*EF + 0.25*NL + 0.2*NCO + 0.05*NAC, 0.7*EF + 0.25*NL + 0.05*NAC)$. In order to apply this formula it is required that the Final Exam grade EF and the laboratory grade NL are BOTH equal or higher than 4. If this is not the case (if NE or NL were lower than 4) the final grade of the subject will be calculated as $\min(NF, 4.5)$.

To be able to pass the laboratory it is essential to attend at least 5 of the 6 PRACTICAL sessions that are held. The laboratory grade was calculated from the qualification of the laboratory reports (70%) and from the exam on the activities carried out (30%). To be able to pass the laboratory, the exam grade must be higher than 4 (out of 10 points).

Those students who do not pass the laboratory in the first semestre will be able to take a make-up exam at mid June if they have attended at least 5 out of the 6 laboratory sessions. If they still do not get the minimum grade of 4 in this laboratory make-up exam they will have to do the whole subject again the next year.

Description	Criteria	Type	Weighting system
Written Theoretical-practical tests	Correction of the proposed activities	ACTIVITIES OF EVALUATION DURING THE SEMESTER	20
Laboratory notebook	Correction of the reports and developed activities	ACTIVITIES OF EVALUATION DURING THE SEMESTER	30
Final exam	Correction of the final exam	FINAL TEST	50

Official exam dates for academic year 2024-25

Exam session	Date	Time	Group - Classroom(s) allocated	Comments
(C2) Periodo ordinario para asignaturas de primer semestre	14/01/2025			

Academic staff



ABRIL SANCHEZ, ISABEL
Lecturer responsible

THEORY CLASS: Groups: 1
LAB PRACTICALS: Groups: L4
GROUP TUTORIALS: Groups: T1



CATURLA TEROL, MARIA JOSE

THEORY CLASS: Groups: 3
GROUP TUTORIALS: Groups: T3



FARRANDO PEREZ, ALEX
LAB PRACTICALS: Groups: L2 , L3 , L6



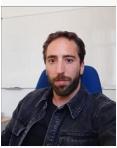
GARCIA CASES, FRANCISCO JAVIER
THEORY CLASS: Groups: 2
GROUP TUTORIALS: Groups: T2



MARTINEZ GARCIA, ANDRES
LAB PRACTICALS: Groups: L2 , L3 , L5



MARTINEZ GIL, DANIEL
LAB PRACTICALS: Groups: L1 , L7



PNIGOURAS, PANTELIS

LAB PRACTICALS: Groups: L9



URBAN GUTIERREZ, JORGE FRANCISCO

LAB PRACTICALS: Groups: L4

Groups

THEORY CLASS

Group	Semester	Morning or afternoon session	Language	No. of enrolled students	On registration, distribution
Gr. 1 (THEORY CLASS) : 1	1S	Morning	Spanish	94	<ul style="list-style-type: none"> ▪ Not allowed DEGREE IN MARINE SCIENCES From ID document number A - To ID document number N
Gr. 2 (THEORY CLASS) : 2	1S	Morning	Spanish	82	<ul style="list-style-type: none"> ▪ Not allowed DEGREE IN MARINE SCIENCES From ID document number P - To ID document number Z
Gr. 3 (THEORY CLASS) : 3(ARA)	1S	Morning	English	16	<ul style="list-style-type: none"> ▪ Not allowed DEGREE IN MARINE SCIENCES

LAB PRACTICALS

Group	Semester	Morning or afternoon session	Language	No. of enrolled students	On registration, distribution
Gr. L1 (LAB PRACTICALS) : L1	1S	All day	Spanish	24	<ul style="list-style-type: none"> ▪ Not allowed DEGREE IN MARINE SCIENCES From ID document number A - To ID document number C
Gr. L2 (LAB PRACTICALS) : L2	1S	All day	Spanish	24	<ul style="list-style-type: none"> ▪ Not allowed DEGREE IN MARINE SCIENCES From ID document number D - To ID document number F
Gr. L3 (LAB PRACTICALS) : L3	1S	All day	Spanish	24	<ul style="list-style-type: none"> ▪ Not allowed DEGREE IN MARINE SCIENCES From ID document number G - To ID document number J
Gr. L4 (LAB PRACTICALS) : L4	1S	All day	Spanish	23	<ul style="list-style-type: none"> ▪ Not allowed DEGREE IN MARINE SCIENCES From ID document number K - To ID document number N

Group	Semester	Morning or afternoon session	Language	No. of enrolled students		On registration, distribution
Gr. L5 (LAB PRACTICALS) : L5	1S	All day	Spanish	26	▪ Not allowed DEGREE IN MARINE SCIENCES	From ID document number P - To ID document number R
Gr. L6 (LAB PRACTICALS) : L6	1S	All day	Spanish	27	▪ Not allowed DEGREE IN MARINE SCIENCES	From ID document number S - To ID document number V
Gr. L7 (LAB PRACTICALS) : L7	1S	All day	Spanish	28		From ID document number W - To ID document number Z
Gr. L9 (LAB PRACTICALS) : L9(ARA)	1S	All day	English	16	▪ Not allowed DEGREE IN MARINE SCIENCES	

GROUP TUTORIALS

Group	Semester	Morning or afternoon session	Language	No. of enrolled students		On registration, distribution
Gr. T1 (GROUP TUTORIALS) : T1	1S	All day	Spanish	94	▪ Not allowed DEGREE IN MARINE SCIENCES	From ID document number A - To ID document number N
Gr. T2 (GROUP TUTORIALS) : T2	1S	All day	Spanish	82	▪ Not allowed DEGREE IN MARINE SCIENCES	From ID document number P - To ID document number Z
Gr. T3 (GROUP TUTORIALS) : T3(ARA)	1S	All day	English	16	▪ Not allowed DEGREE IN MARINE SCIENCES	

Timetables

THEORY CLASS

Group	Start date	End date	Day	Start time	End time	Lecture room
1	09/09/2024	09/09/2024	LUN	10:00	11:00	A1/1-50X 
1	13/09/2024	13/09/2024	VIE	09:00	10:00	A1/1-50X 
1	16/09/2024	16/09/2024	LUN	10:00	11:00	A1/1-50X 
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1	20/09/2024	20/09/2024	VIE	09:00	10:00	A1/1-50X 
1	23/09/2024	23/09/2024	LUN	10:00	11:00	A1/1-50X 
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Group	Start date	End date	Day	Start time	End time	Lecture room
1	08/11/2024	08/11/2024	VIE	09:00	10:00	A1/1-50X 
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2	14/10/2024	14/10/2024	LUN	08:00	09:00	A1/1-51X 
2	16/10/2024	16/10/2024	MIE	10:00	11:00	A1/1-51X 
2	18/10/2024	18/10/2024	VIE	08:00	09:00	A1/1-51X 
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2	04/11/2024	04/11/2024	LUN	08:00	09:00	A1/1-51X 
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Group	Start date	End date	Day	Start time	End time	Lecture room
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2	09/12/2024	09/12/2024	LUN	08:00	09:00	A1/1-51X 
2	13/12/2024	13/12/2024	VIE	08:00	09:00	A1/1-51X 
2	16/12/2024	16/12/2024	LUN	09:00	10:00	A1/1-51X 
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3	25/10/2024	25/10/2024	VIE	10:00	11:00	A1/1-28M 

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3	15/11/2024	15/11/2024	VIE	10:00	11:00	A1/1-28M 
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3	09/12/2024	09/12/2024	LUN	09:00	10:00	A1/1-28M 
3	13/12/2024	13/12/2024	VIE	10:00	11:00	A1/1-28M 
3	16/12/2024	16/12/2024	LUN	10:00	11:00	A1/1-28M 
3	20/12/2024	20/12/2024	VIE	10:00	11:00	A1/1-28M 

LAB PRACTICALS

Group	Start date	End date	Day	Start time	End time	Lecture room
L1	19/09/2024	19/09/2024	JUE	11:30	13:00	0007P2025. 
L1	26/09/2024	26/09/2024	JUE	11:30	13:00	0007P2025. 
L1	03/10/2024	03/10/2024	JUE	11:30	14:30	0007P2025. 
L1	17/10/2024	17/10/2024	JUE	11:30	14:30	0007P2025. 
L1	24/10/2024	24/10/2024	JUE	11:30	14:30	0007P2025. 
L1	31/10/2024	31/10/2024	JUE	11:30	14:30	0007P2025. 
L1	07/11/2024	07/11/2024	JUE	11:30	14:30	0007P2025. 
L1	21/11/2024	21/11/2024	JUE	11:30	13:30	0007P2025. 
L2	19/09/2024	19/09/2024	JUE	11:30	13:00	0007P2021. 
L2	26/09/2024	26/09/2024	JUE	11:30	13:00	0007P2021. 
L2	03/10/2024	03/10/2024	JUE	11:30	14:30	0007P2021. 
L2	17/10/2024	17/10/2024	JUE	11:30	14:30	0007P2021. 
L2	24/10/2024	24/10/2024	JUE	11:30	14:30	0007P2021. 
L2	31/10/2024	31/10/2024	JUE	11:30	14:30	0007P2021. 
L2	07/11/2024	07/11/2024	JUE	11:30	14:30	0007P2021. 
L2	21/11/2024	21/11/2024	JUE	11:30	13:30	0007P2021. 
L3	18/09/2024	18/09/2024	MIE	11:30	13:00	0007P2025. 
L3	25/09/2024	25/09/2024	MIE	11:30	13:00	0007P2025. 
L3	02/10/2024	02/10/2024	MIE	11:30	14:30	0007P2025. 
L3	16/10/2024	16/10/2024	MIE	11:30	14:30	0007P2025. 
L3	23/10/2024	23/10/2024	MIE	11:30	14:30	0007P2025. 

Group	Start date	End date	Day	Start time	End time	Lecture room
L3	30/10/2024	30/10/2024	MIE	11:30	14:30	0007P2025. 
L3	06/11/2024	06/11/2024	MIE	11:30	14:30	0007P2025. 
L3	20/11/2024	20/11/2024	MIE	11:30	13:30	0007P2025. 
L4	16/09/2024	16/09/2024	LUN	11:30	13:00	0007P2025. 
L4	23/09/2024	23/09/2024	LUN	11:30	13:00	0007P2025. 
L4	30/09/2024	30/09/2024	LUN	11:30	14:30	0007P2025. 
L4	14/10/2024	14/10/2024	LUN	11:30	14:30	0007P2025. 
L4	21/10/2024	21/10/2024	LUN	11:30	14:30	0007P2025. 
L4	28/10/2024	28/10/2024	LUN	11:30	14:30	0007P2025. 
L4	04/11/2024	04/11/2024	LUN	11:30	14:30	0007P2025. 
L4	18/11/2024	18/11/2024	LUN	11:30	13:30	0007P2025. 
L5	16/09/2024	16/09/2024	LUN	11:30	13:00	0007P2022. 
L5	23/09/2024	23/09/2024	LUN	11:30	13:00	0007P2022. 
L5	30/09/2024	30/09/2024	LUN	11:30	14:30	0007P2022. 
L5	14/10/2024	14/10/2024	LUN	11:30	14:30	0007P2022. 
L5	21/10/2024	21/10/2024	LUN	11:30	14:30	0007P2022. 
L5	28/10/2024	28/10/2024	LUN	11:30	14:30	0007P2022. 
L5	04/11/2024	04/11/2024	LUN	11:30	14:30	0007P2022. 
L5	18/11/2024	18/11/2024	LUN	11:30	13:30	0007P2022. 
L6	17/09/2024	17/09/2024	MAR	11:30	13:00	0007P2025. 
L6	24/09/2024	24/09/2024	MAR	11:30	13:00	0007P2025. 

Group	Start date	End date	Day	Start time	End time	Lecture room
L6	01/10/2024	01/10/2024	MAR	11:30	14:30	0007P2025. 
L6	15/10/2024	15/10/2024	MAR	11:30	14:30	0007P2025. 
L6	22/10/2024	22/10/2024	MAR	11:30	14:30	0007P2025. 
L6	29/10/2024	29/10/2024	MAR	11:30	14:30	0007P2025. 
L6	05/11/2024	05/11/2024	MAR	11:30	14:30	0007P2025. 
L6	19/11/2024	19/11/2024	MAR	11:30	13:30	0007P2025. 
L7	18/09/2024	18/09/2024	MIE	11:30	13:00	0007P2025. 
L7	25/09/2024	25/09/2024	MIE	11:30	13:00	0007P2025. 
L7	02/10/2024	02/10/2024	MIE	11:30	14:30	0007P2025. 
L7	16/10/2024	16/10/2024	MIE	11:30	14:30	0007P2025. 
L7	23/10/2024	23/10/2024	MIE	11:30	14:30	0007P2025. 
L7	30/10/2024	30/10/2024	MIE	11:30	14:30	0007P2025. 
L7	06/11/2024	06/11/2024	MIE	11:30	14:30	0007P2025. 
L7	20/11/2024	20/11/2024	MIE	11:30	13:30	0007P2025. 
L9	17/09/2024	17/09/2024	MAR	11:30	13:00	0007P2022. 
L9	24/09/2024	24/09/2024	MAR	11:30	13:00	0007P2022. 
L9	01/10/2024	01/10/2024	MAR	11:30	14:30	0007P2022. 
L9	15/10/2024	15/10/2024	MAR	11:30	14:30	0007P2022. 
L9	22/10/2024	22/10/2024	MAR	11:30	14:30	0007P2022. 
L9	29/10/2024	29/10/2024	MAR	11:30	14:30	0007P2022. 
L9	05/11/2024	05/11/2024	MAR	11:30	14:30	0007P2022. 

Group	Start date	End date	Day	Start time	End time	Lecture room
L9	19/11/2024	19/11/2024	MAR	11:30	13:30	0007P2022 

GROUP TUTORIALS

Group	Start date	End date	Day	Start time	End time	Lecture room
T1	11/09/2024	11/09/2024	MIE	09:00	10:00	A1/1-50X 
T1	02/10/2024	02/10/2024	MIE	09:00	10:00	A1/1-50X 
T1	23/10/2024	23/10/2024	MIE	09:00	10:00	A1/1-50X 
T1	20/11/2024	20/11/2024	MIE	09:00	10:00	A1/1-50X 
T1	11/12/2024	11/12/2024	MIE	09:00	10:00	A1/1-50X 
T1	18/12/2024	18/12/2024	MIE	09:00	10:00	A1/1-50X 
T2	11/09/2024	11/09/2024	MIE	10:00	11:00	A1/1-51X 
T2	02/10/2024	02/10/2024	MIE	10:00	11:00	A1/1-51X 
T2	23/10/2024	23/10/2024	MIE	10:00	11:00	A1/1-51X 
T2	20/11/2024	20/11/2024	MIE	10:00	11:00	A1/1-51X 
T2	11/12/2024	11/12/2024	MIE	10:00	11:00	A1/1-51X 
T2	18/12/2024	18/12/2024	MIE	10:00	11:00	A1/1-51X 
T3	11/09/2024	11/09/2024	MIE	08:00	09:00	A1/1-28M 
T3	02/10/2024	02/10/2024	MIE	08:00	09:00	A1/1-28M 
T3	23/10/2024	23/10/2024	MIE	08:00	09:00	A1/1-28M 
T3	20/11/2024	20/11/2024	MIE	08:00	09:00	A1/1-28M 
T3	11/12/2024	11/12/2024	MIE	08:00	09:00	A1/1-28M 

Group	Start date	End date	Day	Start time	End time	Lecture room
T3	18/12/2024	18/12/2024	MIE	09:00	10:00	A1/1-28M 