

KIC EIT Raw Materials labelled IDS-FunMat-INNO Doctoral Programme

Spring School on Life Cycle of Materials and Project & Risk Management

Official programme

23-29 April 2017 in Lisbon

Organised by:



in collaboration with:



Sponsored by:



General information:

Venue (see maps in Annex 1, 1a, 1b, 1c):

FCT-UNL (Faculty of Sciences and Technology, Univ. NOVA de Lisboa)
Caparica (Almada Municipality, South of the Tagus River) , Portugal
(Most of the sessions will be held in the CENIMAT building)

Date (see general schedule and programme in detail in the forthcoming pages):

23rd to 29th April 2017 (6 days, starting with a Welcome reception)

Accommodation (see also maps in Annex 1):

All the students from the IDS-FunMat Inno Doctoral Programme are accommodated in the SANA Malhoa Hotel (Av. José Malhoa 8, 1099-089 Lisboa) and the FCT's invited students from the Montanuniversitaet Leoben (Austria) are accommodated in the University Residential Fraústo da Silva, located in the campus.

Maintenance (see also pag. 2):

The organization guarantees all the meals (breakfast, lunch and dinner) for the students of the programme and also for invited personalities. All the morning (M) and afternoon (A) sessions will have a coffee break (11:00 – 11:15h and 16:00 – 16:15h).

Accessibilities (see timetables in Annex 2):

All the students will receive a bag, at the Welcome session (23rd April), that will contain a train's pass charged with the necessary amount to link the place they are accommodated and the FCT-UNL, during all Spring School action.

Complementary information at: <https://www.fertagus.pt/ing/fertagus#> (train that cross the river) and <http://www.mts.pt/horarios.php> (only in Portuguese) ("surface Metro").

Confidentiality:

Students are asked to sign a declaration related to the confidentiality of some actions held during the Spring School (e.g. laboratory classes on the 28th April), since some experiments will be performed within the development of ongoing research projects.

ECTS Credits:

The organizers have submitted the programme of the Spring School to the Dean of the Faculty in order to have a decision of on the accreditation of the action as a Supplement of the Degree.

National Holyday:

The 25th April is a National Holiday in Portugal (the "Carnations Revolution"). The local organization will guaranty all the necessary conditions for a normal work during this day. The popular commemorations are very interesting, particular the fireworks of the Almada town which can be seen all around the nearby Tagus River (at 12 p.m.).

Learning objectives:

- Make sure students have a basic understanding of the value chain of raw materials focusing on metals exploration & mining, substitution and recycling, but covering in principle exploration, mining, processing, materials selection & development (including substitution of critical and toxic raw materials), manufacturing, use and end of life options (including recycling)
- Have students understand different criticality assessment methods and apply the EU list of critical raw materials with the origin of the materials to the PhD research
- Ensure students know ways how to assess environmental impacts and the resource flows of raw materials and products by life cycle assessment and material flow analysis as a way to measure progress towards sustainability
- Get students value the results of criticality and life cycle sustainability analysis studies for materials selection in addition to mechanical and chemical properties
- Have students grasp the opportunities of using the life cycle concepts for sustainable materials development in their PhD studies
- Provide knowledge on project & risk Management, including how to demonstrably increase the likelihood of project success, how to improve the identification of risk on your types of projects and how to develop successful mitigation and contingency plans

Executive summary:

6 days of Spring School, including 1 ½ days of visits to Mining & Recycling sites, 1 ½ days of course on Project and Risk Management, 1 day of lectures on life cycle of materials, mining & exploration, substitution of critical & toxic raw materials, recycling & circular economy, criticality & sustainability assessment, ½ day of project work, ½ day of materials science lab visit (working on substitution), plus 1 day of arrival, welcome reception and excursion.

Programme overview:

	23	24 Monday	25 Tuesday	26 Wednesday	27 Thursday	28 Friday	29 Saturday
9:00							
	M						
13:00		Lectures (1): Introduction Life Cycle Criticality Mining	Project and Risk Mannag. (2)	Mine visit (1)	Recycling plant visit	FCT Labs visit: Substitution	Offered excursion
14:00							
	A						
18:00		Project and Risk Mannag. (1)	Project and Risk Mannag. (3)	Mine visit (2)	Lectures (2): Recycling Substitution Sustainability	Brain storming on PhD projects	Departure
	E	Catering	Students (1) Project work	Get together	Students (2) Project work	School Dinner	
variable							

Coffee breaks @ 11:00-11:15h and 16:00-16:15h

Detailed Programme:

Sunday, 23 April – Day 1:

Afternoon – Arrival of IDS-FunMat Inno students to the SANA Malhoa Hotel in Lisbon
Av. José Malhoa 8, Lisboa, Portugal

18:30 – 20:00h – Welcome Reception at Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa
Residencial Fraústo da Silva (Univ. NOVA Lisboa)
Azinhaga Castelo Picão, Caparica, Portugal
(Coord: 38°39'53.55"N 9°12'32.36"W)

Observations:

- 1 - Students will leave the hotel at 17:45h accompanied by someone from the organization team to learn about the way Hotel - FCT using public transport.
- 2 – It is expected that the FCT's Dean will join this Welcome Reception.

Monday, 24 April - Day 2:

Morning - Lectures on Introduction, Life Cycle of Materials, Criticality, Exploration & Mining (at Leopoldo Guimarães amphitheatre, CENIMAT)(see the location of CENIMAT building in Annex 1c):

Coordination: Prof. Rodrigo Martins (FCT-UNL, PT)

9:00-9:15h - Introduction to the Spring School - Prof. Rodrigo Martins, Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa (PT)

9:15-10:00h - Criticality of Materials - Prof. Armin Reller, University of Augsburg/ FhG-WKS (DE)

10:00-10:45h – The Iberian Pyrite Belt, an important source of base (and high-tech) metals in Europe – Dr. Carlos Rosa, Exploration Manager Ozdogu Portugal Mining & Exploration (PT)

10:45-11:00h – Discussion upon previous lectures

11:00-11:15h – Coffee break

Coordination: Prof. Guido Sonnemann (University of Bordeaux, FR)

11:15-12:00h – Mining different ore concentrations - Prof. Machado Leite - Porto University/ LNEG (PT)

12:00-12:45h - Life Cycle of Materials, including introduction to students' project work – Prof. Guido Sonnemann, University of Bordeaux (FR)

12:45-13:00h – Discussion upon previous lectures

13:00-14:00h – Lunch at the “Campus.com” restaurant

Afternoon - Course on Project and Risk Management (1) (at room classroom 1.1, CENIMAT):

14:00-16:00h – Prof. Andreas Riel, INP Grenoble (FR)

16:00-16:15h – Coffee break

16:15-18:00h (cont.) – Prof. Andreas Riel, INP Grenoble (FR)

19:00-20:00h – Dinner: catering at CENIMAT building

Observation:

Students are invited to participate in an evening tour at the city of Almada and watch the fireworks (12:00 p.m.) to commemorate the Portuguese Day of Liberty (25th April), also called the “Carnation Revolution”.

Tuesday, 25 April - Day 3:

Morning - Course on Project and Risk Management (2) (at room classroom 1.1, CENIMAT):

9:00-11:00h – Prof. Andreas Riel, INP Grenoble (FR)

11:00-11:15h – Coffee break

11:15-13:00h (cont.) – Prof. Andreas Riel, INP Grenoble (FR)

13:00-14:00h – Lunch at the “Campus.com” restaurant

Afternoon - Course on Project and Risk Management (3) (at room classroom 1.1, CENIMAT):

14:00-16:00h – Prof. Andreas Riel, INP Grenoble (FR)

16:00-16:15h – Coffee break

16:15-18:00h (cont.) – Prof. Andreas Riel, INP Grenoble (FR)

Early evening - Time for students' project work (at room classroom 1.1, CENIMAT):

18:30 – 20:00h

- What are the raw materials you work with in your research projects? Where do they come from? Which raw materials you use are critical? What are the bottleneck, the resource strategy and the future perspectives to address the criticality in your research project?

20:00-21:00h – Dinner: catering at CENIMAT building

Wednesday, 26 April - Day 4:

Morning – Mine Visit (1)

Coordination: Prof. José Almeida (FCT-UNL, PT)

6:00h - Departure from the SANA Malhoa Hotel

6:15h – Departure from FCT-UNL (Caparica)

10:00-12:00h - Neves Corvo Mine explored by Somincor (approx.. 200 km from Lisbon): Ores of poly-metallic sulphides – mainly copper and tin. Visit to the mineral separation and preparation plant.

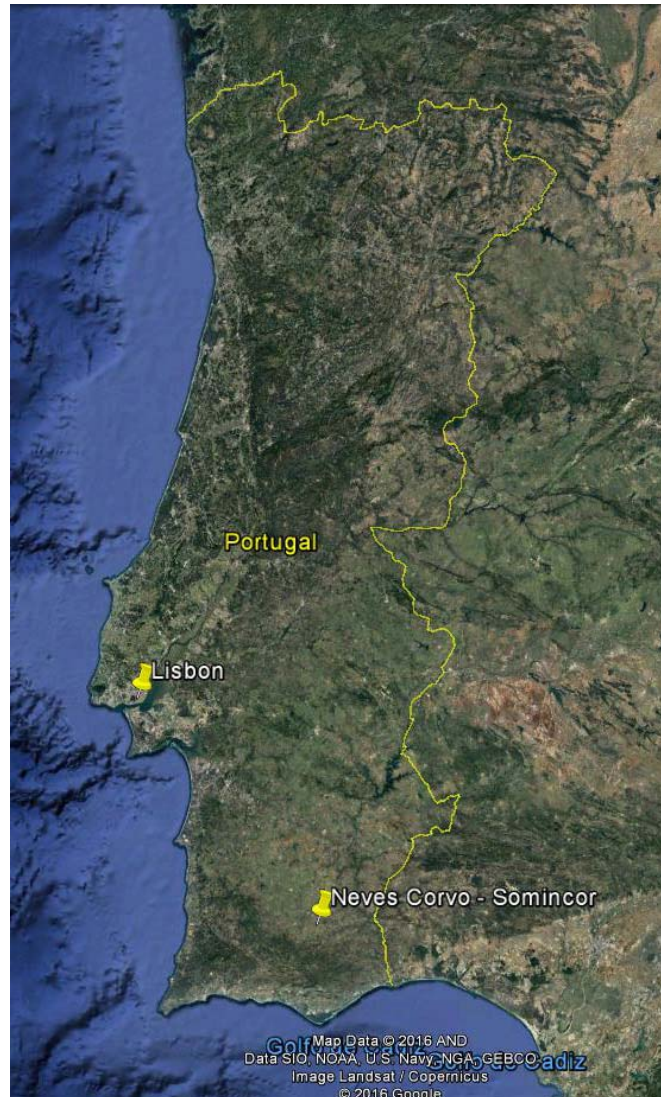
12:30-13:30h – Lunch offered by Somincor

Afternoon – Mine Visit (tailings dam)

Coordination: Prof. José Almeida (FCT-UNL, PT)

14:00-16:00 h – Continuation

16:00-18:30h – Trip back to FCT



Important note: For the visit to the mine the use of dressing with **long sleeves** is mandatory

Evening – Get together

19:00-20:30h – IDS-FunMat-INNO and Leoben Univ. students and teachers meet with PhD students of the FCT-UNL (catering served at the “Campus.com” restaurant)

Thursday, 27 April - Day 5:

Morning – Recycling Plant Visit

8:15h - Departure from the SANA Malhoa Hotel

8:45h – Departure from FCT-UNL (Caparica)

9:15h-12:45 h - AmbiGroup plant (Seixal – 15 km from Lisbon) - Recycling of main metals (Cu, Al, Zn) and metal alloys (Zn, stainless steel, magnetic steel, brass).

13:00-14:00h – Lunch at the “Campus.com” restaurant

Afternoon - Lectures on Recycling, Substitution, Sustainability and Circular Economy (at Leopoldo Guimarães amphitheatre, CENIMAT):

Coordination: Prof. Elvira Fortunato (FCT-UNL, PT)

14:00-14:45 - Rubber sources, applications and recycling - Prof. Roberto Scotti, University Milano-Bicocca (IT –tbc)

14:45-15:30h – (Life Cycle Assessment in raw materials sectors) – Dr. Sandra Belboom, University of Liege (BE)

15:30-16:00h – Discussion upon previous lectures

16:00-16:15h – Coffee break

16:15-17:00h - Life Cycle Assessment and Material Flow Analysis for assessing the Sustainability of Recycling and Renewable Energy Options - Prof. Liselotte Schebek, Technical University of Darmstadt/ FhG-IWKS (DE – tbc)

17:00-17:45h - Towards a low carbon and circular economy, Júlia Seixas, Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa/ DCEA-CENSE and Climate KIC Portugal initiative (PT)

17:45-18:00h – Discussion upon previous lectures

Early evening - Time for students' project work

18:30 – 20:00h

- What are your learnings from the visits for taking the sources and the end of life options of the raw materials used into account in your research projects? What are the substitution and recycling options for the materials you work with? How can Life Cycle Assessment and Material Flow Analysis support your research to measure progress towards more sustainable materials? In which way can your research contribute to a low carbon and circular economy?

20:00-21:00h – Dinner: catering at CENIMAT building

Observation:

17:00-18:30h - Meeting of the Governing Board with Video Conference (room 1.1). This meeting is followed by a dinner in a restaurant in Costa da Caparica.

Friday, 28 April - Day 6:

Morning – Substitution potentials in Chemistry and Materials Science research

This activity is performed in 3 different laboratories simultaneously; the Labs are located in 1) the Environmental Department; 2) the CENIMAT building and 3) the Chemistry Department, (for location of buildings see Annex 1c).

So, each student chooses one of the following activities to participate:

Lab 1 (Lab 347, DCEA building, 3rd floor) (5 students)

Title: “Eco-friendly technology for P recovery and emerging contaminants removal from soil and reclaimed water” (Coordinated by Prof. Alexandra Ribeiro, DCEA-CENSE)

Topics:

- Part 1 (9:30–11:00h) (by Nazaré Couto and Ana Rita Ferreira)
- Seminar on electrokinetic (EK) and electrodialytic (ED) processes. EK/ED cell designs; EK stationary cell (soil)
 - "Hands-on" - preparation of an ED cell (effluent)
- Part II (11:30 - 13:00h) (by Eduardo Mateus and Ana Rita Ferreira)
- Analytical overview (SPE extraction and HPLC analysis)
 - Chromatogram analysis and extraction of the main information
 - Brief discussion-synthesis on remediation/recovery techniques; applicability to different scenarios

Lab 2 (Lab CENIMAT building) (6 students)

Title: “Preparation of inks and nanostructures for the printing of transistors based on zinc tin oxide inks” (Coordinated by Prof. Elvira Fortunato, DCM-CENIMAT)

Topics:

- Part 1 (9:30–11:00h) - Seminar on the production of solutions and nanostructures based on zinc oxide and tin oxide (by Daniela Salgueiro and Ana Rovisco)
- Part 2 (11:30–13:00h) - Printing of transistors by ink-jet and screen-printing techniques (by Daniela Salgueiro and Inês Cunha)

Lab 3 (Lab DQ Building, 4th floor) (Lab 407) (5 students)

Title: “Metal-induced gellation of bacterial polysaccharides” (Coordinated by Prof. Maria Ascensão Reis, DQ-UCIBIO/REQUINTE)

Topics:

- Part I (9:30–11:00h) (by Filomena Freitas and Patrícia Reis):
- Seminar on bioreactor polysaccharide production and polymer extraction
 - Hands-on: Preparation of polysaccharide aqueous solutions
- Part II (11:30 - 13:00h) (by Filomena Freitas and Letícia Fialho)
- Seminar on polysaccharide gellation induced by metal cations
 - Hands-on: Preparation of polysaccharide gel beads in the presence of Cu²⁺, Fe²⁺ and Fe³⁺

13:00-14:00h – Lunch at the “Campus.com” restaurant

Afternoon – Brainstorming session on PhD projects and closing

14:00-17:00h (with coffee break at 16:00 – 16.15h)

Coordination: Prof. Guido Sonnemann (University of Bordeaux, FR)

- Brainstorming with PhD students facilitated by Prof. Guido Sonnemann, University of Bordeaux (FR) and Prof. Sandra Belboom, University of Liege (BE), aiming at:
 - Giving the PhD students the ability to think beyond boundaries by looking at the whole value chain of raw materials and systematically explore and generate new ideas and inspire others in this process and contribute to the further development of those ideas.
 - Thinking of ideas on how to include aspects of substitution, design for recycling and circular economy in the PhD projects.
 - Using the multiple dimensions of substitution referring to the criticality and toxicity of raw materials in the research work.
 - Applying criticality and life cycle sustainability concepts to identify short and long term future consequences of plans and decisions from an integrated scientific, ethical and intergenerational perspective and to merge this into the students' research activities, moving towards a sustainable society.
 - Encouraging the PhD students to combine their research experiences with the criticality and life cycle concepts to develop and test new or significantly improved, more sustainable materials.
 - Boosting the PhD students' ability to autonomously and systematically transform the learnings made during the workshop about the life cycle of materials into research problems and to motivate colleagues to also support them in their new research ideas.
 - Using the Project and Risk Management skills obtained to support the adequate advancement and finalisation of the PhD project.

Closing of Spring School on Life Cycle of Materials and Project & Risk Management:

17:15-18:00h – Putting the student at the heart of the KIC's education strategy - Dr. Serge Monturet, Education Officer, EIT Raw Materials / Central co-location Centre (FR)

Evening – IDS-FunMat-INNO Spring School dinner (at Convento dos Capuchos – space gently offered by the Almada Municipality). Departure from the Faculty at 19:00h. Return to the Faculty at 22:00h. The transportation is guaranteed by the Almada Municipality and all the participants are invited to use it.

Saturday, 29 April - Day 7:

Morning – Excursion

- Sightseeing trip in Lisbon for the IDS-FunMat Inno students

Afternoon – Departure

Learning outcomes:

The following outcomes are expected with regard to the objectives of the Raw Materials Academy:

- Contribution to the education of a T-shaped professional
- Understanding of of the value chain of raw materials (with materials and processes selection)
- Expertise and experiences with Mining & Exploration, Substitution of critical & toxic raw materials and Recycling & Circular Economy
- Awareness on criticality of critical raw materials (assessment and EU list)
- Basic knowledge on sustainability (assessment by life cycle assessment and material flow analysis)
- Capabilities in project and risk management

And the following outcomes are key elements of the EIT quality assurance system:

- Innovation skills by learning about sustainability as a market factor
- Creativity skills by learning about different substitution and recycling options
- Learning by doing through the implementation of the concepts related to the life cycle of materials into the PhD research

Evaluation:

The outcomes of the workshop will be evaluated by a 2-way process:

- PhD students' learning evaluation on how the life cycle concepts have been understood by applying them to their research (during brainstorming session and prepared by students' project work)
- Overall workshop learning efficiency evaluation by questionnaire to be answered by all participants on afternoon of Friday, 28th April 2017

People involved

Hosts:

Prof. Rodrigo Martins - Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa (PT)

Prof. José Carlos Kullberg - Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa (PT)

Education Officer, EIT Raw Materials:

Dr. Serge Monturet, EIT Raw Materials/ Central co-location Centre (FR)

Coordinator team of the IDS-FunMat-INNO Doctoral Programme:

Prof. Thierry Toupance – University of Bordeaux (FR)

Prof. Jean Etourneau – University of Bordeaux (FR)

Dr. Bernhard Zeimetz – CNRS, Bordeaux (FR)

Invited speakers and contributors:

Dr. Sandra Belboom - University of Liege (BE)

Prof. Elvira Fortunato - Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa/ DCM - CENIMAT (PT)

Prof. Machado Leite - Porto University/ LNEG (PT)

Prof. Maria Ascensão Reis - Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa/ DQ – LAQV-REQUIMTE (PT)

Prof. Armin Reller - University of Augsburg/ FhG-IWKS (DE)

Prof. Alexandra Ribeiro - Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa/ DCEA-CENSE (PT)

Dr. HDR Andreas Riel – EMIRacle AISBL, Program Manager Innovation/ INP Grenoble (FR)

Dr. Carlos Rosa - Exploration Manager Ozdogu Portugal Mining & Exploration (PT)

Prof. Liselotte Schebek - Technical University of Darmstadt/ FhG-IWKS (DE)

Prof. Roberto Scotti - University Milano Bicocca (IT)

Prof. Júlia Seixas - Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa/ DCEA-CENSE and Climate KIC Portugal initiative (PT)

Scientific Chairman of Workshop on Life Cycle of Materials:

Prof. Guido Sonnemann – University of Bordeaux (FR):

Guido Sonnemann is professor specialised in life cycle assessment at the University of Bordeaux, where he is holder of a regional chair on resource efficiency and leader of the research group on life cycle approaches for sustainable chemistry (CyVi) at the Institute for Molecular Sciences (ISM). His research focuses on assessing the sustainability of new materials and addressing methodologies and data needs for life cycle based sustainability assessment tools such as integrating criticality into the life cycle assessment framework and coupling it with material flow analysis and input-output tables.



Google Earth

38°41'51.30"N 9°10'31.48"W elev 0 m altitude de visualização 14.19 km

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Annex 1a
(Locations in the Northern side of the River - Lisbon)





Annex 1c
(Campus Map)



- Red arrow: main entrance in the campus
- Blue arrow: "Universidade" stop of MTS surface Metro
- Red circle: CENIMAT building
- Blue circle: Chemistry and Environmental Sciences Departments (Labs)



TIMETABLES FERTAGUS

INF.H.191 DEZ2011

Weekdays
Direction Lisbon - Setúbal

ROMA-AREEIRO	ENTRECAMPOS	SETE-RIOS	CAMPOLIDE	PRAGAL	CORROIOS	FOROS DE AMORA	FOGUETEIRO	COINA	PENALVA	PINHAL NOVO	VENDA DO ALCAIDE	PALMELA	SETÚBAL
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17:43	17:45	17:49	17:52	18:00	18:05	18:08	18:12	18:17	18:21	18:28	18:32	18:36	18:41
17:53	17:55	17:59	18:02	18:10	18:15	18:18	18:22	18:26	-	-	-	-	-
18:03	18:05	18:09	18:12	18:20	18:25	18:28	18:32	18:36	-	-	-	-	-
18:13	18:15	18:19	18:22	18:30	18:35	18:38	18:42	18:47	18:51	18:58	19:02	19:06	19:11
18:23	18:25	18:29	18:32	18:40	18:45	18:48	18:52	18:56	-	-	-	-	-
18:33	18:35	18:39	18:42	18:50	18:55	18:58	19:02	19:06	-	-	-	-	-
18:43	18:45	18:49	18:52	19:00	19:05	19:08	19:12	19:17	19:21	19:28	19:32	19:36	19:41
18:53	18:55	18:59	19:02	19:10	19:15	19:18	19:22	19:26	-	-	-	-	-
19:03	19:05	19:09	19:12	19:20	19:25	19:28	19:32	19:36	-	-	-	-	-
19:13	19:15	19:19	19:22	19:30	19:35	19:38	19:42	19:47	19:51	19:58	20:02	20:06	20:11
19:23	19:25	19:29	19:32	19:40	19:45	19:48	19:52	19:56	-	-	-	-	-
19:33	19:35	19:39	19:42	19:50	19:55	19:58	20:02	20:06	-	-	-	-	-
19:43	19:45	19:49	19:52	20:00	20:05	20:08	20:12	20:17	20:21	20:29	20:33	20:38	20:42
19:53	19:55	19:59	20:02	20:10	20:15	20:18	20:22	20:26	-	-	-	-	-

ROMA-AREEIRO	ENTRECAMPOS	SETE-RIOS	CAMPOLIDE	PRAGAL	CORROIOS	FOROS DE AMORA	FOGUETEIRO	COINA	PENALVA	PINHAL NOVO	VENDA DO ALCAIDE	PALMELA	SETÚBAL
20:03	20:05	20:09	20:12	20:20	20:25	20:28	20:32	20:36	-	-	-	-	-
20:13	20:15	20:19	20:22	20:30	20:35	20:38	20:42	20:47	20:51	20:58	21:02	21:06	21:11
20:23	20:25	20:29	20:32	20:40	20:45	20:48	20:52	20:56	-	-	-	-	-
20:33	20:35	20:39	20:42	20:50	20:55	20:58	21:02	21:06	-	-	-	-	-
20:43	20:45	20:49	20:52	21:00	21:05	21:08	21:12	21:17	21:21	21:28	21:32	21:36	21:41
21:03	21:05	21:09	21:12	21:20	21:25	21:28	21:32	21:36	-	-	-	-	-
21:23	21:25	21:29	21:32	21:40	21:45	21:48	21:52	21:56	-	-	-	-	-
21:43	21:45	21:49	21:52	22:00	22:05	22:08	22:12	22:17	22:21	22:28	22:32	22:36	22:41
22:13	22:15	22:19	22:22	22:30	22:35	22:38	22:42	22:46	-	-	-	-	-
22:43	22:45	22:49	22:52	23:00	23:05	23:08	23:12	23:17	23:21	23:28	23:32	23:36	23:41
23:13	23:15	23:19	23:22	23:30	23:35	23:38	23:42	23:46	-	-	-	-	-
23:58	0:00	0:04	0:07	0:15	0:20	0:23	0:27	0:32	0:36	0:43	0:47	0:51	0:56
0:43	0:45	0:49	0:52	1:00	1:05	1:08	1:12	1:17	1:21	1:28	1:32	1:36	1:41
1:28	1:30	1:34	1:37	1:45	1:50	1:53	1:57	2:01	-	-	-	-	-



TIMETABLES FERTAGUS

INF.H.191 DEZ2011

Weekdays
Direction Setúbal - Lisbon

SETÚBAL	PALMELA	VENDA DO ALCAIDE	PINHAL NOVO	PENALVA	COINA	FOGUETEIRO	FOROS DE AMORA	CORROIOS	PRAGAL	CAMPOLIDE	SETE-RIOS	ENTRECAMPOS	ROMA-AREIRO
-	-	-	-	-	5:33	5:38	5:41	5:44	5:49	5:58	6:00	6:04	6:06
-	-	-	-	-	5:53	5:58	6:01	6:04	6:09	6:18	6:20	6:24	6:26
5:48	5:53	5:58	6:02	6:08	6:13	6:18	6:21	6:24	6:29	6:38	6:40	6:44	6:46
-	-	-	-	-	6:33	6:38	6:41	6:44	6:49	6:58	7:00	7:04	7:06
-	-	-	-	-	6:43	6:48	6:51	6:54	6:59	7:08	7:10	7:14	7:16
6:28	6:33	6:38	06:42	6:48	6:53	6:58	7:01	7:04	7:09	7:18	7:20	7:24	7:26
-	-	-	-	-	7:03	7:08	7:11	7:14	7:19	7:28	7:30	7:34	7:36
-	-	-	-	-	7:13	7:18	7:21	7:24	7:29	7:38	7:40	7:44	7:46
6:58	7:03	7:08	7:12	7:18	7:23	7:28	7:31	7:34	7:39	7:48	7:50	7:54	7:56
-	-	-	-	-	7:33	7:38	7:41	7:44	7:49	7:58	8:00	8:04	8:06
-	-	-	-	-	7:43	7:48	7:51	7:54	7:59	8:08	8:10	8:14	8:16
7:28	7:33	7:38	7:42	7:48	7:53	7:58	8:01	8:04	8:09	8:18	8:20	8:24	8:26
-	-	-	-	-	8:03	8:08	8:11	8:14	8:19	8:28	8:30	8:34	8:36
-	-	-	-	-	8:13	8:18	8:21	8:24	8:29	8:38	8:40	8:44	8:46
7:58	8:03	8:08	8:12	8:18	8:23	8:28	8:31	8:34	8:39	8:48	8:50	8:54	8:56
-	-	-	-	-	8:33	8:38	8:41	8:44	8:49	8:58	9:00	9:04	9:06
-	-	-	-	-	8:43	8:48	8:51	8:54	8:59	9:08	9:10	9:14	9:16
-	-	-	-	-	-	8:53	8:57	9:00	9:05	9:14	9:17	9:20	9:22
8:28	8:33	8:38	8:42	8:48	8:53	8:58	9:01	9:04	9:09	9:18	9:20	9:24	9:26
-	-	-	-	-	9:03	9:08	9:11	9:14	9:19	9:28	9:30	9:34	9:36
-	-	-	-	-	9:13	9:18	9:21	9:24	9:29	9:38	9:40	9:44	9:46
8:58	9:03	9:08	9:12	9:18	9:23	9:28	9:31	9:34	9:39	9:48	9:50	9:54	9:56
-	-	-	-	-	9:33	9:38	9:41	9:44	9:49	9:58	10:00	10:04	10:06
-	-	-	-	-	9:43	9:48	9:51	9:54	9:59	10:08	10:10	10:14	10:16
-	-	-	-	-	10:03	10:08	10:11	10:14	10:19	10:28	10:30	10:34	10:36
9:58	10:03	10:08	10:12	10:18	10:23	10:28	10:31	10:34	10:39	10:48	10:50	10:54	10:56
-	-	-	-	-	10:43	10:48	10:51	10:54	10:59	11:08	11:10	11:14	11:16
-	-	-	-	-	11:03	11:08	11:11	11:14	11:19	11:28	11:30	11:34	11:36

SETÚBAL	PALMELA	VENDA DO ALCAIDE	PINHAL NOVO	PENALVA	COINA	FOGUETEIRO	FOROS DE AMORA	CORROIOS	PRAGAL	CAMPOLIDE	SETE-RIOS	ENTRECAMPOS	ROMA-AREEIRO
10:58	11:03	11:08	11:12	11:18	11:23	11:28	11:31	11:34	11:39	11:48	11:50	11:54	11:56
-	-	-	-	-	11:43	11:48	11:51	11:54	11:59	12:08	12:10	12:14	12:16
-	-	-	-	-	12:03	12:08	12:11	12:14	12:19	12:28	12:30	12:34	12:36
11:58	12:03	12:08	12:12	12:18	12:23	12:28	12:31	12:34	12:39	12:48	12:50	12:54	12:56
-	-	-	-	-	12:43	12:48	12:51	12:54	12:59	13:08	13:10	13:14	13:16
-	-	-	-	-	13:03	13:08	13:11	13:14	13:19	13:28	13:30	13:34	13:36
12:58	13:03	13:08	13:12	13:18	13:23	13:28	13:31	13:34	13:39	13:48	13:50	13:54	13:56
-	-	-	-	-	13:43	13:48	13:51	13:54	13:59	14:08	14:10	14:14	14:16
-	-	-	-	-	14:03	14:08	14:11	14:14	14:19	14:28	14:30	14:34	14:36
13:58	14:03	14:08	14:12	14:18	14:23	14:28	14:31	14:34	14:39	14:48	14:50	14:54	14:56
-	-	-	-	-	14:43	14:48	14:51	14:54	14:59	15:08	15:10	15:14	15:16
-	-	-	-	-	15:03	15:08	15:11	15:14	15:19	15:28	15:30	15:34	15:36
14:58	15:03	15:08	15:12	15:18	15:23	15:28	15:31	15:34	15:39	15:48	15:50	15:54	15:56
-	-	-	-	-	15:43	15:48	15:51	15:54	15:59	16:08	16:10	16:14	16:16
-	-	-	-	-	16:03	16:08	16:11	16:14	16:19	16:28	16:30	16:34	16:36
15:58	16:03	16:08	16:12	16:18	16:23	16:28	16:31	16:34	16:39	16:48	16:50	16:54	16:56
-	-	-	-	-	16:43	16:48	16:51	16:54	16:59	17:08	17:10	17:14	17:16
-	-	-	-	-	16:53	16:58	17:01	17:04	17:09	17:18	17:20	17:24	17:26
-	-	-	-	-	17:03	17:08	17:11	17:14	17:19	17:28	17:30	17:34	17:36
-	-	-	-	-	17:13	17:18	17:21	17:24	17:29	17:38	17:40	17:44	17:46
16:58	17:03	17:08	17:12	17:18	17:23	17:28	17:31	17:34	17:39	17:48	17:50	17:54	17:56
-	-	-	-	-	17:33	17:38	17:41	17:44	17:49	17:58	18:00	18:04	18:06
-	-	-	-	-	17:43	17:48	17:51	17:54	17:59	18:08	18:10	18:14	18:16
-	-	-	-	-	17:53	17:58	18:01	18:04	18:09	18:18	18:20	18:24	18:26
-	-	-	-	-	18:03	18:08	18:11	18:14	18:19	18:28	18:30	18:34	18:36
-	-	-	-	-	18:13	18:18	18:21	18:24	18:29	18:38	18:40	18:44	18:46
17:58	18:03	18:08	18:12	18:18	18:23	18:28	18:31	18:34	18:39	18:48	18:50	18:54	18:56
-	-	-	-	-	18:33	18:38	18:41	18:44	18:49	18:58	19:00	19:04	19:06
-	-	-	-	-	18:43	18:48	18:51	18:54	18:59	19:08	19:10	19:14	19:16
-	-	-	-	-	18:53	18:58	19:01	19:04	19:09	19:18	19:20	19:24	19:26
-	-	-	-	-	19:03	19:08	19:11	19:14	19:19	19:28	19:30	19:34	19:36
-	-	-	-	-	19:13	19:18	19:21	19:24	19:29	19:38	19:40	19:44	19:46

SETÚBAL	PALMELA	VENDA DO ALCAIDE	PINHAL NOVO	PENALVA	COINA	FOGUETEIRO	FOROS DE AMORA	CORROIOS	PRAGAL	CAMPOLIDE	SETE-RIOS	ENTRECAMPOS	ROMA-AREEIRO
18:58	19:03	19:08	19:12	19:18	19:23	19:28	19:31	19:34	19:39	19:48	19:50	19:54	19:56
-	-	-	-	-	19:33	19:38	19:41	19:44	19:49	19:58	20:00	20:04	20:06
-	-	-	-	-	19:43	19:48	19:51	19:54	19:59	20:08	20:10	20:14	20:16
19:28	19:33	19:38	19:42	19:48	19:53	19:58	20:01	20:04	20:09	20:18	20:20	20:24	20:26
-	-	-	-	-	20:03	20:08	20:11	20:14	20:19	20:28	20:30	20:34	20:36
-	-	-	-	-	20:23	20:28	20:31	20:34	20:39	20:48	20:50	20:54	20:56
20:18	20:23	20:28	20:32	20:38	20:43	20:48	20:51	20:54	20:59	21:08	21:10	21:14	21:16
-	-	-	-	-	21:03	21:08	21:11	21:14	21:19	21:28	21:30	21:34	21:36
-	-	-	-	-	21:23	21:28	21:31	21:34	21:39	21:48	21:50	21:54	21:56
21:18	21:23	21:28	21:32	21:38	21:43	21:48	21:51	21:54	21:59	22:08	22:10	22:14	22:16
-	-	-	-	-	22:13	22:18	22:21	22:24	22:29	22:38	22:40	22:44	22:46
22:18	22:23	22:28	22:32	22:38	22:43	22:48	22:51	22:54	22:59	23:08	23:10	23:14	23:16
23:18	23:23	23:28	23:32	23:38	23:43	23:48	23:51	23:54	23:59	0:08	0:10	0:14	0:16
0:18	0:23	0:28	0:32	0:38	0:43	0:48	0:51	0:54	0:59	1:08	1:10	1:14	1:16



Horários

em vigor de 8 de Setembro a 14 de Julho

www.mts.pt E-mail info@mts.pt Telefone 211 127 056

See "Linha 3" (in green)

DIAS ÚTEIS

Linha 1. Sentido Corroios → Cacilhas

Table with 2 columns: Destino and Hora. Lists departure times for Line 1 from Corroios to Cacilhas, including stops like Casa do Povo, Santo Amaro, Laranjeiro, etc.

Linha 1. Sentido Cacilhas → Corroios

Table with 2 columns: Destino and Hora. Lists departure times for Line 1 from Cacilhas to Corroios, including stops like Gil Vicente, Almada, São João Baptista, etc.

Linha 2. Sentido Corroios → Pragal

Table with 2 columns: Destino and Hora. Lists departure times for Line 2 from Corroios to Pragal, including stops like Casa do Povo, Santo Amaro, Laranjeiro, etc.

Linha 2. Sentido Pragal → Corroios

Table with 2 columns: Destino and Hora. Lists departure times for Line 2 from Pragal to Corroios, including stops like Ramalhal, Cova da Piedade, etc.

Linha 3. Sentido Cacilhas → Universidade

Table with 2 columns: Destino and Hora. Lists departure times for Line 3 from Cacilhas to Universidade, including stops like Gil Vicente, Almada, São João Baptista, etc.

Linha 3. Sentido Universidade → Cacilhas

Table with 2 columns: Destino and Hora. Lists departure times for Line 3 from Universidade to Cacilhas, including stops like Monte Caparica, Fomega, Boa Esperança, etc.