



TRAIL Training & Education: PhD course program and rules

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1 Introduction

In this document we present the TRAIL Training and Education (T&E) program. This program is periodically updated to comply with the ongoing developments of local graduate school programs/research masters at the different TRAIL-universities, and the changing needs and desires of PhD students. Graduate schools provide T&E with respect to more general topics and skills; TRAIL provides courses in the domain of transport, infrastructure and logistics. Local graduate schools decide upon the acceptance and credits/points of TRAIL courses, for their local PhD program.

2 The TRAIL Training and Education Program

The focal point of our education program is “To educate PhD students in TRAIL domain knowledge (empirical and theoretical), methods, and skills. Because our program includes not only knowledge but also skills we use the term Training and Education (T&E).” (See also Appendix I for a more detailed explanation on the role of TRAIL in Training and Educating PhD Students)

2.1 T&E Rules

TRAIL is not a PhD-granting institute and has as such no formal incentives for PhD students (and supervisors) for a mandatory course program. However, most TRAIL-universities, that are responsible for granting PhD degrees, have strict education rules for PhD students within their local Graduate Schools. These requirements often include that part of the PhD student education should be on the domain of the PhD student, in our case the domain of Transport, Infrastructure and Logistics (TIL¹).

TRAIL applies the following principles/rules:

- **TRAIL welcomes all PhD students (TRAIL and non-TRAIL² PhD students) for following courses.**
- **At a minimum, PhD students who follow only one or more TIL-courses receive a certificate per course. If they, in addition, successfully pass for the course (e.g. by an assignment), this will be made explicit on the certificate.**

TRAIL encourages its PhD students to follow courses in the TIL domain at other Research Schools and elsewhere. Our experience is that Research Schools such as Beta, Disc, LNMB, Nethur, ERIM, and Tinbergen Institute provide valuable PhD courses of high quality that can be relevant to individual TRAIL PhD students. And some well-respected universities worldwide also provide excellent courses. Currently, TRAIL PhD students can follow courses for free at Beta, Disc and STREEM, and at GP-OML (Graduate Program Operations Management and Logistics, in which TRAIL participates). Please note that courses at other institutes often require a registration fee. In addition, Research Masters and Master courses can be followed, but these courses have specific rules with respect to the awarded credits (see Table 1, footnote 3).

TRAIL offers the option to go for a TRAIL diploma (15 ECTS) – for more details see appendix 2.

¹ The TIL-domain focuses on Transport, Infrastructure and Logistics, combining disciplines such as economics, engineering, operations research, managerial sciences, psychology, planning and their various theories/ methods.

² For non-TRAIL PhD students a fee applies, unless there is an agreement between TRAIL and the PhD student's institute. See section 3.3 for details.

2.2 T&E Program and courses

The TRAIL T&E program consists of three parts (see Table 1):

- I. Basic courses support PhD students to become TRAIL scholars: scholars with a basis of knowledge and skills about all TRAIL-related areas, the domains of transport, infrastructure, and logistics. These basic courses are considered highly important, as these give the PhD student a solid framework, based upon which he/she can choose future research directions, better explain his/her research to TRAIL colleagues (and non-TRAIL-ers), as well as understand the research approaches and outcomes of TRAIL colleagues.
- II. General courses are follow-up courses on some basic courses and/or independent of the specialization (T, I, or L) of the student.
- III. Specialization courses are advanced courses that can be chosen according to the individual needs and preferences of the student. TRAIL offers three specializations (in line with the TRAIL research themes): Transport, Infrastructure, and Logistics (T, I, and L).

Table 1: TRAIL courses¹

	<ul style="list-style-type: none"> • TRAIL skills I - Introduction to TRAIL & the PhD student process [0.25 ECTS] [S]¹
I Basic TRAIL Courses	<ul style="list-style-type: none"> • TRAIL Fundamental Domain Knowledge of TIL systems [1-4 ECTS] [D]^{2, 5} • TRAIL Theories and Methods [1-3 ECTS] [T,M]
II General TRAIL Courses	<ul style="list-style-type: none"> • TRAIL skills II –Societal Relevance of your PhD Research [0.25-1 ECTS] [S] • TRAIL Data analysis and statistics [1-3 ECTS] [S] • Transport Innovations [1-2 ECTS] [D] • TRAIL Writing a Literature Review in the TIL Domain [1-4 ECTS] [S] • Writing and Publishing a TRAIL Research Article [0.5-1 ECTS] [S] • Discrete Choice Modelling [1-3 ECTS] [T] • Machine Learning [1-4 ECTS] [M] • T, I, or L basic disciplinary course³ [1-3 ECTS] [D] • (Writing a TRAIL research proposal (e.g. NWO) [1-3 ECTS][S])⁴
III TRAIL Specialisation Courses ⁶	<ul style="list-style-type: none"> • Traffic Flow Phenomena [1-3 ECTS] [I] • Behavioural Aspects in Transport [0.5-1 ECTS] [I] • Transport Logistics Modelling⁵ [1-4 ECTS] [L] • Facility Logistics Management⁵ [1-4 ECTS] [L] • Quantitative Modelling and Analysis of Supply Chains⁵ [1-4 ECTS] [L] • Advanced Inventory Theory⁵ [1-4 ECTS] [L] • Freight Transport Management⁵ [1-4 ECTS] [L] • Passenger Transport Systems⁵ [1-4 ECTS] [L]

¹ For each course (except TRAIL skills I) we present two numbers for ECTS. The first number refers to participation only (no exam/assignment), the second to participation plus a successful exam/assignment. TUD GS has separate rules for awarding GS credits.

² Indicative classification of course type: D = domain knowledge, T = theory, M = methodology, S = skills. Note that Local GS and/or supervisors might deviate from this classification.

³ TRAIL allows its PhD students to follow Master courses in the TIL domain at TRAIL- and non-TRAIL universities. The number of ECTS of PhD or Research Master courses count fully for the TRAIL program if additional to the TRAIL curriculum; for regular Master courses only 70% of the number of ECTS is included.

⁴ Based on demand of TRAIL students/staff members.

⁵ Courses given by TRAIL and Research School Beta within the Graduate Program Operations Management and Logistics (GP-OML). See Appendix III for more information

⁶ T: Transport, I: Infrastructure, L: Logistics

3 Course application and practicalities

3.1 Application for a course

TRAIL-courses can be found on the TRAIL Website (www.rstrail.nl/agenda), and are also announced by e-mail at regular times. PhD students can enrol in a course by filling in the course application form (to be found at the bottom of each course page on the TRAIL website). We strongly recommend PhD students to apply for a course as soon as possible. The TRAIL office will inform the PhD student in time when and where the course will start. When applying for courses provided by other institutes (e.g. Beta, ERIM, Disc, Nethur and VU (STREEM)), please send an e-mail to info@rstrail.nl.

3.2 Participating or passing a course

Everyone who participates in all course days receives a certificate indicating the name of the course, the date(s) the course was given, and the amount of ECTS related to participation. In addition, for those who choose to do the assignment (e.g. research master students, TRAIL PhD students opting for a TRAIL diploma) the certificate will be expanded with a grade or pass clarification and an adjusted amount of ECTS.

3.3 Course fees

The fees for following a course at TRAIL (or a TRAIL associated institutes) depend on the type of TRAIL membership one has (i.e. course demander) and the course-supplying institute (see Table 4-1).

The main rules are:

- PhD students from TRAIL-faculties can follow courses for free at TRAIL, GP-OML, TRAIL-associated institutes (Beta, ERIM, Disc, Nethur), and Research Masters STREEM (VU);
- Postdocs, (ass.)fellows, and alumni from TRAIL-faculties can follow courses for free at TRAIL and at GP-OML;
- Research Master students from TRAIL faculties can follow all courses for free at TRAIL and some of the GP-OML courses;
- Professionals from the Ministry of Infrastructure and the Environment (I&M) can follow courses for free at TRAIL and some of the GP-OML courses.

See table 2 on page 4 for an overview.

Traveling costs, etc. are at the student's own responsibility.

3.4 Terms of cancellation

TRAIL reserves the right to cancel a course in case the number of participants is too low (e.g. below 10). Such cancellation is mostly based on the fact that giving a course for only a few students is too much to ask from a course manager and/or teacher, and also for financial reasons.

Participants can cancel their application up to one week before the start of the course. A cancellation within one week of the start of the course results in losing priority when applying for another course for non-paying participants, and a cancellation charge of 50% of the course fee for paying participants.

3.5 Contact information:

TRAIL Research School
Jaffalaan 5
2628 BX Delft
The Netherlands

Phone: +31-(0)15-2786046

E-mail: info@rstrail.nl

Table 2: Financial rules for attending a course.

Supplier	Courses supplied by					
	TRAIL	GP-OML	Beta	ERIM, Disc, Nethur	Research Masters by TRAIL faculties ⁶	Research Masters STREEM (by VU)
Demandeur						
TRAIL PhD student ¹	free	free	free	free	n.o. ²	free
Beta PhD student	free	free	free	n.o.	n.o.	n.o.
PhD student in ERIM/Disc/Nethur	free	partly free ³	n.o.	n.o.	n.o.	n.o.
PhD student in BIVEC	partly free ⁴	partly free ^{3,4}	n.o.	n.o.	n.o.	n.o.
Other PhD students	125 €/day	125 €/day	n.o.	125 €/day	n.o.	n.o.
Research Master students TRAIL-faculty	free	partly free ²	n.o.	n.o.	n.o.	n.o.
Research Master students STREEM(VU)	free	partly free ³	n.o.	n.o.	n.o.	free
TRAIL postdoc, (ass)fellow, alumni	free	free	n.o.	n.o.	n.o.	n.o.
I&M employees	free	partly free ⁵	n.o.	n.o.	n.o.	n.o.
Other Professionals	250 €/day	250 €/day	n.o.	n.o.	n.o.	n.o.

¹ including other PhD students at TRAIL member faculties.

² not offered by TRAIL, see local rules at supplying institute.

³ courses provided by TRAIL within GP-OML are free, else 125 € per course day.

⁴ up to 5 courses in total per year across all BIVEC PhD students, else 125 € per course day.

⁵ courses provided by TRAIL within GP-OML are free, else 250 € per course day.

⁶ CiTG, 3Me, TBM, EWI, L&R (TUD), RSM (EUR), Bk (TUE), FM (RU), CTW (UT), FEB, RW, FGM (RUG)

Appendix I – The role of TRAIL in Training and Educating PhD students

In this appendix the role of TRAIL Research School in contributing to the qualifications that apply to a PhD student is explained. The members of European Higher Education Area (EHEA) prescribe the qualifications a PhD student should have when completed a PhD study.³ The Dutch Ministry of Education, Culture, and Science/The Accreditation Organisation of the Netherlands and Flanders (NVAO) has adopted them. Table 3 gives these qualifications.

Within the Dutch context, multiple organisations support the PhD student in achieving these qualifications, the most important being: the Promoter/Supervisor, the local Graduate School (GS), and the Research School (RS). Table 3 presents the level of support within the context of TRAIL research school. The type of support varies from individual meetings and traditional courses to learning by doing (e.g. presenting a paper, giving a lecture, visiting a masterclass/conference, etc.) and day-to-day supervision.

Table 3: Qualifications of PhD student and (indicative) contributing bodies

Qualifications	Bodies	TRAIL Promoter/ Supervisor	Local Graduate Schools at TRAIL-universities	TRAIL Research School
1. A demonstration of a systematic understanding of a field of study and a mastery of the skills and methods of research associated with that field		XXX		XXX
2. A demonstration of the ability to conceive, design, implement and adapt a substantial process of research with scholarly integrity		XX	XXX	X
3. The capability of critical analysis, evaluation and synthesis of new and complex ideas		XX	XX	XX
4. A contribution through original research that extends the frontier of knowledge by developing a substantial body of work, some of which merits national or international refereed publication (including PhD thesis)		XXX	X	XX
5. The ability to communicate with their peers, the larger scholarly community and with society in general about their areas of expertise		XX	XX	XX
6. To be able to promote, within academic and professional contexts, technological, social or cultural advancement in a knowledge based society		XX	XX	XX

Number of 'X's represents the level of contribution (indicative) of a body to achieving a qualification

From here we limit ourselves to education related needs only (GS and RS). In general, the Graduate School supports the PhD student in acquiring general PhD research knowledge and skills, while the Research School focuses on domain-specific/applied PhD research knowledge and skills. As such, the local Graduate Schools and TRAIL Research School are complementary, in line with the recommendations of the KNAW, VSNU and NWO.⁴

Now that we have made explicit that the main contribution of the role of TRAIL research school to meeting PhD qualifications is related to the first qualification in table 2-1, we can make explicit the focal point of our education program: To educate PhD students in TRAIL domain knowledge (empirical and theoretical), methods, and skills. Because our program includes not only knowledge but also skills we use the term Training and Education (T&E). TRAIL also supports PhD students to acquire other qualifications as presented in Table 3, not only via education, but also in other ways. For example TRAIL provides a course training people to do a literature review (relevant for qualification 3), organizes conferences, master classes and symposia (relevant for qualifications 5 and 6).

³ http://www.ehea.info/Uploads/QF/050520_Framework_qualifications.pdf

⁴ http://www.know.nl/content/Internet_KNAW/publicaties/pdf/20101032.pdf

Appendix II – Getting a TRAIL diploma

TRAIL PhD students who follow and pass an education program of at least 15 ECTS of TIL-courses receive a TRAIL diploma if this program includes (see also figure below):

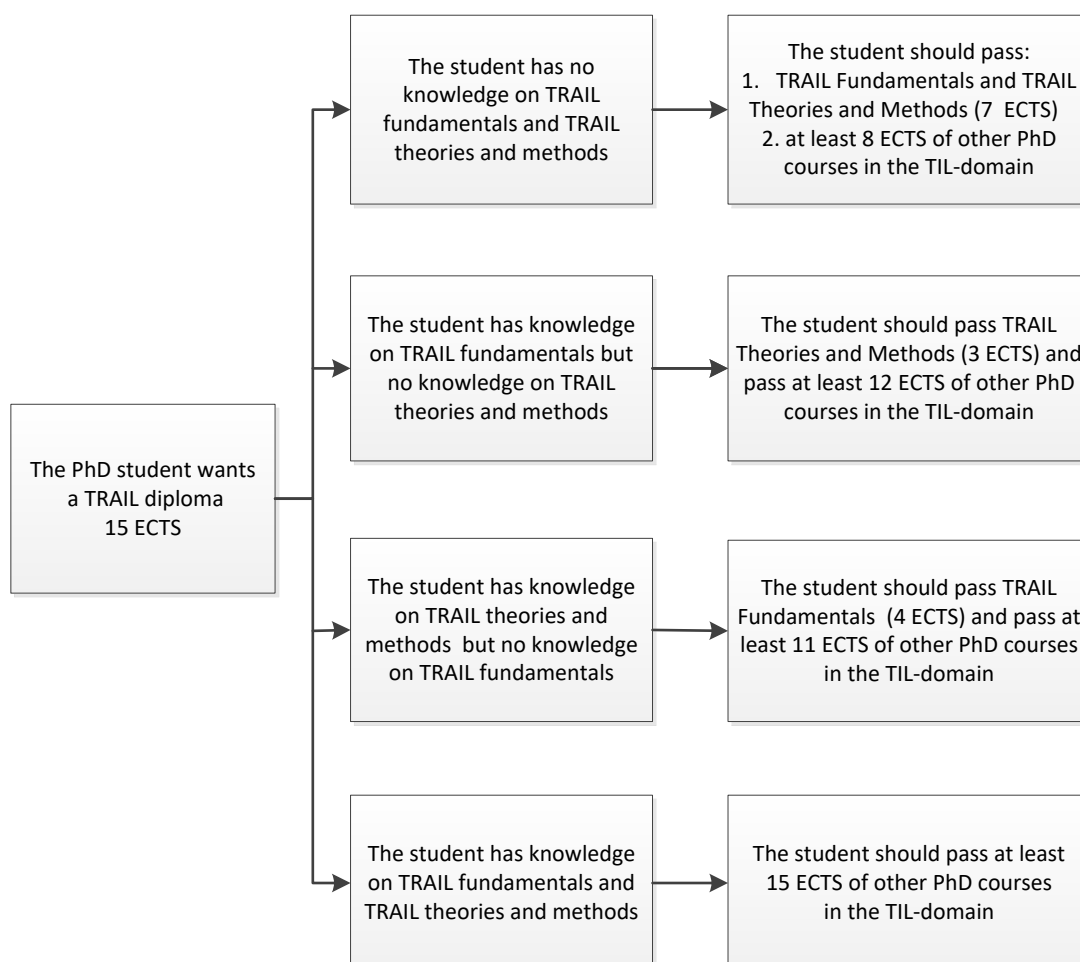
- 2 mandatory courses: TRAIL Fundamentals and TRAIL Theories & Methods (7 ECTS),
- at least 8 ECTS of other PhD TIL-courses.

Note that only attending a course does not count for the TRAIL diploma, one need to pass the course assignments as well. As far as TRAIL is concerned, PhD students can decide upon the choice for the diploma-option at any time. This can be before starting to do research, but also in a later stage. In case the student already obtained the knowledge provided in the mandatory course(s), s/he should pass other TIL PhD course(s) with an equivalent number of ECTS, i.e. no exemption is granted.

In case TRAIL PhDs want to follow and pass PhD courses outside TRAIL and use these credits for their TRAIL diploma, they should contact the TRAIL office for more information and approval.

PhD Students can obtain a maximum of 1 ECTS by visiting at least one TRAIL conference and present a paper or a poster. This credit cannot be used for the required 15 ECTS for obtaining the TRAIL diploma, as the TRAIL diploma requires that courses are 'passed'. Conference participation does not have any form of assignment or exam.

The mandatory courses do not apply to all PhD students. If they already successfully participated in courses in the past (Masters, Bachelors) that are the equivalent of TRAIL basic courses, they do not have to follow these courses at TRAIL (note: students have to prove that they successfully participated, please contact TRAIL office). In that case the minimum of 15 ECTS still applies.



Appendix III – Graduate Program Operations Management and Logistics (GP-OML)

Research Schools TRAIL and Beta have developed a joint Graduate Program on Operations Management and Logistics (sponsored by Dinalog). This program has the following characteristics:

- The OML program runs for 2 years (see [GP-OML website](#)) and consists of 8 courses (each about 4 ECTS, including preparation and assignment);
- Per semester 12 course days are available. Each semester, two or three 4-day courses are given on a fixed day (preferably a Wednesday) every week at a central location (Utrecht, near Central Station);
- A course day starts at 10:00 h. and ends at 16:00 h. Per course, a rotating schedule is followed in order to enable studying between lectures and/or make intermediate assignments (i.e. course A, B, and C are planned over 12 days as follows: A,B,C - A,B,C - A,B,C - A,B,C);
- Each course will be examined by e.g. an assignment.

In the GP-OML cycle, the following courses are offered (see www.gpoml.nl for course scheduling):

- *Fundamental domain knowledge of transport systems* (Van Wee & Annema);
- *Facility logistics management* (De Koster);
- *Quantitative modelling and analysis of supply chains* (De Kok);
- *Logistics and freight transport systems analysis* (Zuidwijk & Tavasszy)
- *Advanced inventory theory* (Van Houtum & Dekker);
- *Freight transport management* (Vis);
- *Passenger Transport Systems* (Cats & Schmidt);
- *Machine Learning* (Van Hoesel).