THE SETAC EUROPE CERTIFICATION OF ENVIRONMENTAL RISK ASSESSORS

Guidance document on the procedure to become a registered SETAC Europe Certified Environmental Risk Assessor

Version 2, approved by the SETAC Europe Council, 17th January 2017
Version 1, approved by the SETAC Europe Council, 1st April 2015

1. Introduction and general overview ................................................................. 1
2. Enrolment ........................................................................................................ 4
3. SETAC Europe Registered Graduate Environmental Risk Assessor ............. 6
   3a Following courses to complete a list of competences in 9 topics .................. 6
   3b Internship: “Environmental Risk Assessment in practice” ......................... 9
   3c The final graduation exam ........................................................................ 10
4. SETAC Europe Registered Certified Environmental Risk Assessor .............. 12
5. Direct registration as a Certified Environmental Risk Assessor .................. 14
6. How to remain a Certified Environmental Risk Assessor ............................ 16
Annex 1: Descriptions of the nine Environmental Risk Assessment topics .......... 17
Annex 2: “Dublin Descriptors” ....................................................................... 24
1. **Introduction and general overview**

This document describes the procedures according to which SETAC members and others can become a registered “SETAC Europe Certified Environmental Risk Assessor” (CRA).

The **standard procedure** to become a registered “Certified Environmental Risk Assessor” (CRA) follows three steps, as illustrated schematically in Figure 1. Yet, the CRA programme is flexible and deviations from the standard procedure are possible, provided that such deviations are requested by candidates via a written motivation and that they are approved by the Registration Committee.

![Figure 1 Flow chart of the standard procedure to become a SETAC Europe registered Certified Environmental Risk Assessor (CRA).](image-url)
The standard procedure follows the following three steps, in the order described below:

1. **Enrolment** into the programme, with the support of a mentor.

2. Becoming a SETAC Europe Registered **Graduate** Environmental Risk Assessor (GRA) by:
   a. Successfully following SETAC Europe registered courses to complete a list of 9 Environmental Risk Assessment (ERA) competences. In order to obtain a competence, the candidate must succeed for such courses as proven by an evaluation by individual course organisers. Waiving of competences is possible, based on providing proof that competences have already been acquired.

   AND

   b. Conducting an Environmental Risk Assessment during an internship of minimum 8 weeks (in a business or government environment) and delivering a concise written report (in English) about it. For candidates already having a job in an ERA environment (business or government) this job can be considered equivalent to an internship, but these candidates also need to deliver such a report.

   AND

   c. Passing the final graduation exam in front of a Graduation Examination Panel (GEP), which includes three independent expert jury members who ultimately make the decision. This exam is comparable to a dissertation defence held at universities and consists of an oral presentation (of the written report, as in 2b), followed by discussion with the jury. This graduation exam can, for example, be held at SETAC Europe Annual Meetings.

3. Becoming a SETAC Europe Registered **Certified** Environmental Risk Assessor (CRA) by:
   a. At least two years of on-the-job training in an ERA job (in government, industry or consultancy context)

   AND

   b. Demonstrating commitment to continued education and training in ERA, by regularly participating in activities such as specialised courses, summer schools, symposia, and conferences (such as those sorts of activities organised by SETAC).

   AND

   c. Positive evaluation by an independent Certification Judgment Panel (CJP) which will perform the evaluation on the basis of
The programme explicitly differentiates between a **Graduate** Environmental Risk Assessor (GRA) and a **Certified** Environmental Risk Assessor (CRA). SETAC Europe will maintain a register for both. The difference between the two is mainly in the **level of practical experience** and in the **level of specialisation** in a particular area:

- A “**Graduate**” has received the basic theoretical education and training (covering the many different areas of risk assessment, but not necessarily in much detail) and has already acquired basic practical skills during a 2-month internship (or already during a job experience in ERA).

- A “**Certified**” Environmental Risk Assessor will also have received substantial (at least 2 years) on-the-job training and will also have obtained further theoretical and practical specialisation, also through his commitment to continued education and training.

One important idea behind this differentiation is to allow young potentials to acquire a formal recognition of their potential in the Environmental Risk Assessment area (i.e. a “graduate” diploma) that can provide them a competitive advantage on the “ERA job market” at the time they need it the most, i.e. typically shortly after having obtained a Ph.D. degree. The obligatory internship is in that regard considered an added benefit.

Candidates can also apply for immediate **direct registration** as a CRA via the submission of a **dossier for direct registration**, when they fulfil all of following criteria:

- They must be able to clearly argument and demonstrate that they have already obtained all competences of a GRA and a CRA.
- They must have at least 2 years of on the job experience in an ERA job (or at least 6 years if the candidate does not have an M.Sc. or Ph.D. diploma).
- They must demonstrate commitment to continued education and training in ERA, by regularly participating in activities (e.g. organised by SETAC) such as specialised courses, summer schools, or trainings (at least one of these in the last two years), and symposia, workshops or conferences (at least one of these in the last two years).
- They must submit a concise written risk assessment report and succeed for the final graduation exam (same requirement as for a GRA). The submission of such a report and the GRA exam can be waived only for candidates with at least 10 years of ERA job experience, based on a written argumentation and motivation by the candidate.
Dossiers for direct registration must be submitted to the Registration Committee to check for eligibility and to decide on any requests for waiving the GRA exam. The final decision on the certification of such a candidate (i.e. registration as a CRA) is made by the certification judgment panel, according to the same standards as those applied for CRA candidates who have followed the standard program (i.e. considering the same competence requirements). The system of direct registration as a CRA with GRA examination waiving is intended to be in effect for a limited period of time and the end of this period will be announced 6 months in advance on the CRA website.

In the sections below, a more detailed description of each of the different steps is provided.

2. Enrolment

Enrolment can occur at any moment and is initiated by the applicant by submitting an enrolment dossier (via the programme website).

The candidate will first seek a mentor. This mentor must be a SETAC member with demonstrable experience with ERA or having several competences matching those required from a CRA (this requirement is obviously fulfilled in case the mentor is a registered CRA). The mentor’s initial role is to provide guidance and advice in developing the enrolment dossier. The mentor’s role continues until the GRA exam (see further), and mainly includes providing advice and guidance to the candidate in seeking suitable courses and an internship provider.

The enrolment dossier in English needs to contain the following elements:

- Name and current affiliation of the applicant
- A full Curriculum Vitae of the applicant, supplemented with copies of relevant diploma’s (the Registration Committee can ask the candidate for an official transcription in English if it considers this necessary for a proper evaluation).
- Name, current affiliation and a short Curriculum Vitae of the mentor
- A recommendation letter by the mentor, including a statement of agreement with the applicant’s proposal for waiving certain competences (if any) (see below for details on waiving)
- A motivation letter by the candidate, which should also include:
  i. A brief self-evaluation that clearly describes already acquired versus missing competences
  ii. A list of topics from Table 1 (with corresponding competences, see also Annex 1) that the applicant wishes to waive based on his or her Curriculum Vitae (e.g. courses followed in the past, Ph.D. thesis, reports or publications authored or co-authored). For every topic one wants to waive, one must clearly indicate on the basis of which specific element in the Curriculum this is requested and one must provide proof of having acquired most of the competences corresponding to this topic (as described Annex 1). This proof can, for instance, consist of one or more of the following: diploma, university score sheets, proof of successful evaluation for a course, course content description (including name and contact of course instructor), letter of recommendation by the course instructor, copy of M.Sc. and/or Ph.D. dissertation including a summary or abstract of the thesis (if not included in the dissertation), copy of a publication or a report, etc.
iii. To the extent possible at the time of enrolment (i.e., not obligatory), a description of a plan to complete the full list of 9 competences (as in Table 1) may be added. This may already include a proposal to follow certain courses. However, in the context of keeping the programme flexible, proposals to follow certain courses to fulfil the list of 9 competences may occur at any time during the GRA training phase (see part 3 of this document).

Admission to enrol in the programme is decided upon by the Registration Committee, based on all elements of the submitted dossier, while at the same time following the guidance with regard to the candidate’s diploma(s):
- All applicants having an M.Sc. or Ph.D. diploma in a discipline that has significant affinity with environmental risk assessment (e.g., biology, ecology, toxicology, physiology, biochemistry, chemistry, statistics, environmental science) will normally be allowed to enter the programme.
- Applicants not having such a M.Sc. or Ph.D. diploma will be evaluated on a case-by-case basis. For instance, applicants already working in a risk assessment environment, but without a relevant M.Sc. or Ph.D. diploma may be allowed to enrol in the programme based on objective elements presented in the enrolment dossier submitted.

A negative decision on enrolment needs to be substantially motivated by the Registration Committee and communicated to the applicant. This can be accompanied with advice to the applicant on if and how the enrolment dossier should be revised and improved for re-application. In addition and on a topic-by-topic basis, the Registration Committee can either approve or disapprove the candidate’s proposal to waive a certain topic from Table 1 (and associated competences described in Annex 1) or ask for further (or more detailed) proof to be provided by the candidate to allow re-evaluation. A certain topic can only be approved for waiving if sufficient proof is provided to enable an objective evaluation by the Registration Committee. All decisions regarding enrolment dossiers are taken by the Registration Committee on the basis of a simple majority (50% or more in favour of the applicant).

Once admission is granted by the Registration Committee, the candidate will be invited to pay an enrolment fee (information available on programme website). Following receipt of payment of the enrolment fee, the applicant enters the “Graduate Environmental Risk Assessor Training” phase and can start completing the list of 9 competences (as listed in Table 1). The enrolment fee covers all administrative costs until the registration for the GRA exam (see section 2). The programme is not time limited.
3. Becoming a SETAC Europe Registered Graduate Environmental Risk Assessor:

3.a Following courses to complete a list of competences in 9 topics

Table 1 presents a list of the 9 different topics related to environmental risk assessment that someone needs to have basic knowledge about and needs to develop competence in to become a “SETAC Europe Graduate Environmental Risk Assessor”. In Annex 1 the specific content of each of these topics (and descriptions of associated competences and attainment levels) is described in further detail.

Table 1: List of 9 topics in which knowledge and competences need to be obtained to become a SETAC Europe Graduate Environmental Risk Assessor (GRA)

<table>
<thead>
<tr>
<th>Topic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Basic ecology concepts, principles and processes</td>
<td></td>
</tr>
<tr>
<td>2. Basic concepts and principles in regulatory ecotoxicology, environmental risk assessment, and relevant legislative frameworks</td>
<td></td>
</tr>
<tr>
<td>3. Environmental Chemistry: fate of chemicals in the environment</td>
<td></td>
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<tr>
<td>4. Environmental Chemistry: exposure estimation of chemicals in the environment</td>
<td></td>
</tr>
<tr>
<td>5. Sub-organism level (eco)toxicology (mechanistic toxicology): molecular, cellular, biochemical and physiological effects and biomarkers</td>
<td></td>
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<tr>
<td>6. Organism-level ecotoxicology</td>
<td></td>
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<tr>
<td>7. Supra-organism level ecotoxicology or “Chemical Stress Ecology”: effects of chemicals at population, community, ecosystem and landscape-level</td>
<td></td>
</tr>
<tr>
<td>8. Retrospective risk assessment: chemical and bio-monitoring of exposure and effects</td>
<td></td>
</tr>
<tr>
<td>9. Statistics for environmental risk assessors</td>
<td></td>
</tr>
</tbody>
</table>

Depending on the intensity of the courses (e.g. hours per day) and the ratio of actual contact time with the course instructor vs. preparation and study time, completing each topic (and acquiring the associated competences described in Annex 1) will require approximately 5-10 days of “total study load” (= preparation time + actual contact time with course instructors + study time to prepare for evaluation) to complete. This makes each topic (on average) about equivalent to an EU university course of 3 ECTS credits (European Credit Transfer System). A full one-year postgraduate university study in Europe is equivalent to 60 ECTS credits. The complete GRA programme of 9 topics is equivalent to 27 ECTS credits and thus about equivalent to one half year of university post-graduate study. Thus, in the (unlikely) hypothetical case that a candidate cannot waive any competence at all, he or she would have to spend an amount of study-time on courses that is on average equivalent to about one half year of a full-time postgraduate university study.

It is important to note that a formal evaluation by the course organiser is required (e.g., an exam) in order to validate a competence. Courses without formal evaluation can never qualify for the programme or for validating competences (see also further).

It is acknowledged that the division into the separate topics in the list (Table 1, Annex 1) will not necessarily fall exactly together with the contents of organised courses and that, on the other
hand, some courses may touch upon more than one topic at the same time. In order to take this into account, a flexible evaluation system will be followed by the Registration Committee to decide if a candidate has or has not completed the full programme (Table 1) with associated competences (Annex 1) to allow registration for the final graduation exam (see further).

The following guidelines should be followed when composing (applicant/candidate + mentor) and evaluating (Registration Committee) a candidate’s study programme:

- The total cumulated education and training (i.e. over all topics/competences combined) should be the equivalent to at least 27 ECTS credits.
- No more than 6 ECTS credits per topic can be considered for getting to the required total training equivalent of 27 ECTS credits.
- Each topic should be covered by an equivalent of at least 2 ECTS credits.

Among the nine 9 CRA topics, topic 1 is a basic, theoretical course on ecology (targeted for applicants with little ecology background). It is anticipated that many applicants will already have this knowledge, so many should be able to ‘waive’ this topic. This course is rather focused on trained chemists, statisticians, etc. who have some affinity to risk assessment, but insufficient background in ecology to perform true “ecological” risk assessments. This “basic ecology course” should be mostly theoretical, but can include some time devoted to practice (e.g. a field excursion).

The other 8 obligatory topics should in principle cover broad concepts in ERA and not focus on particular compartments, chemicals, organisms, or legislations but instead preferably focus on comparative aspects. It is acknowledged that not all courses available will be sufficiently broad on their own in terms of organisms, compounds, legislations and compartments covered. However, in the light of flexibility (see above), it should be possible to combine courses during the entire programme in such a way that in the end a sufficiently wide overview among many classes of compounds, legislations, organisms and compartments is covered. At the time of registration for the graduation exam (see further), the candidate can be asked to explicitly demonstrate how such a wide and broad overview has been achieved (with the help of the mentor). Overall a sound theoretical basis should be provided, but it is recommended that 25-50% of the total time (counted over the full programme of topics) is devoted to practical work, which can include laboratory work, PC calculations/simulations/modelling, site visits, case studies, etc.

The Registration Committee makes available a database of approved, registered courses that are eligible for the programme. The database will contain all relevant information about the course (course organiser, format, %theory/%practical, study time, ECTS credits, web-link, % of each of the 9 topics covered, etc.). In the case information on ECTS credits is not available for a course, the Registration Committee will, in consultation with the course organiser, decide on assigning an ECTS value, taking into account that 5-10 days of “total study time” (=preparation time + actual contact time with the course instructor + study time) is about the equivalent of 3 ECTS credits and also taking into account the number of ECTS credits assigned to equivalent courses in the programme.
Various **types of courses** can be considered, with following examples:

- University courses
  - i. Modular courses (typically organised in blocks of one to two weeks)
  - ii. Semester or year courses (typically organised as a few hours per week for a longer period)
- SETAC Europe summer and winter schools
- Modular courses organised by industry, consulting companies or by government institutions.
- Online courses

Courses should at least comply with following **criteria** to be included in the **SETAC Europe database of registered courses for the Certification of Environmental Risk Assessors programme**:

- Course organisers must agree that their course is included in the database
- Courses or at least course material should be available in **English**
- Courses must have **clear description of aims** that can be checked against the competence levels that candidates need to acquire (as described in Annex 1).
- There must be a **formal evaluation** (e.g. exam) by the course organisers allowing to declare that a candidate has succeeded for the course
- Courses must be **open to all kinds of candidates**, including those who are not employees of the organising companies or institutes
- Preferably **75% or more of the course time/content** should be devoted to one or more ERA topics (Table 1) and, within those topics, to **subtopics** described in Annex 1

Courses included in this database will be revised and re-evaluated regularly (e.g. about every 3 years) by the Registration Committee. If courses do not longer meet all criteria, they can be removed from the database.

Candidates may also propose to follow courses not included in this database (or use such courses for “waiving” certain competences). In that case, any deviations from the criteria mentioned above, should be motivated by the candidate. The suitability of such courses will be evaluated on a case-by-case basis by the Registration Committee. Following approval of the proposed course by the Registration Committee and agreement with the course organiser, the Registration Committee can decide to add the course to the database.

It is important that course organisers **approve** that their course is (i) included in the SETAC Europe certification programme or (ii) is used by a candidate for waiving purposes. It is also important that they are aware of the principles and aims of the certification programme, especially with regard to the need for a formal evaluation of candidates for individual courses. This could for example be achieved by means of a **written and undersigned statement** (which a candidate could add to his application for enrolment dossier) or, more general, with a **memorandum of understanding** or equivalent (in case of addition of a course by the Registration Committee to the database of eligible courses for the programme).
The Registration Committee will maintain a dossier of each individual candidate containing details of all competences waived or acquired and all courses followed, as such keeping track of the progress.

3.b Internship: “Environmental Risk Assessment in practice”, integration of exposure and effect assessment

A crucial element in the programme is that all candidates need to perform an internship (minimum 8 weeks), either in an industry, a consultancy or a government context. The idea behind this is that a win-win situation is created for all parties. Therefore, the internship cannot be waived (except in the case of “direct CRA registration”, see below). However, candidates already conducting or already having conducted a job in an ERA environment, can consider this job as equivalent to this internship. The major aim of the internship is that candidates will have the opportunity to integrate most (if not all) aspects of environmental risk assessment in a practical way and in a job of risk assessment.

In contrast with the basic courses (section 2a), the internship is more of a “specialised” nature, i.e. it may deal with a specific compartment, legislative framework or compound class. In addition, it will also further enable acquiring and/or further developing those competences that go beyond “knowledge” and that are described by so-called “Dublin Descriptors” (see Annex 2).

The internship should be aimed at training the candidate in all of the following aspects in an integrated manner:

- Data collection (in databases, papers, study reports)
- Data quality screening and data selection
- Selection and use of appropriate methods and models for exposure and effect assessment
- Performing exposure, effect and risk assessment
- Writing a risk assessment report and presenting clear conclusions about risks (and if applicable possible mitigation measures)

In practice, the candidate (in consultation with his or her mentor) will seek an appropriate venue for the internship. It is important that the internship provider understands the principles and aims of the certification programme. The candidate then makes a motivated proposal for approval by the Registration Committee. The initiative for seeking an internship provider is with the candidate. Yet, as the certification programme continues to develop, the Registration Committee will aim to maintain a list of possible internship providers.

At the end of the internship, a concise, yet critical and scientific risk assessment report is submitted by the candidate to the Registration Committee (on a confidential basis) (green light for this needs to be given by the mentor and the internship provider).

The report should be written as a scientific document, and include sections such as:

i. introduction, background, scope, aims
ii. materials and methods (exposure, effects, and risk assessment)
iii. results (exposure, effects and risk assessment)
iv. a critical discussion, including the appropriateness of methods used or guidelines followed and recommendation(s) for their improvement

v. conclusions & recommendations

vi. list of cited references.

The report will not only be judged in terms of its timelines, i.e. being scientifically up-to-date with current methods in exposure, effects and risk assessment, but also in terms of the critical evaluation and discussion of these methods.

Together with this submission, the candidate can register to take part in the final graduation exam (see 2c).

Finally, it is noted that, while the programme is aimed at certification of Environmental Risk Assessors, Life Cycle (Impact) Assessment can also be a subject during the internship as long as there is a clear link with or integration of Environmental Risk Assessment principles.

3.c The final graduation exam to become a Graduate Environmental Risk Assessor (GRA)

Every graduation exam will normally take place in the margin of the SETAC Europe Annual Meeting. Each calendar year, candidates can register for the final graduation exam (deadline 31st January).

The criteria to participate in the exam are that:

- the candidate has completed the full list of 9 competences (see 2a)
- a written report in English concerning the internship has been submitted (see 2b) (or will have before 31st March).
- An examination fee is paid before the GRA exam (see programme website for more information). This fee covers administrative and organisational costs for the GRA exam.

In the context of the flexibility of the programme, however, deviations from the above procedure are possible. However, any deviations from this normal registration procedure (i.e. holding the exam in a different period of the year, in a different location or via video-conferencing) should be requested from the Registration Committee at least 3 months before the actual examination date, to allow ample time for the organisation of the exam (in consultation with the candidate and in agreement with the members of the Graduation Examination Panel). In such deviating cases, the written report concerning the internship has to be submitted at the latest 3 months before the actual examination date.

This exam is comparable to a dissertation defence held at universities and consists of an oral presentation (of the written report, as in 2b), followed by a discussion with the examination panel. The discussion will be held on the basis of both the oral presentation and the contents of the written report. The total duration of the exam shall be between 30 and 60 minutes, of which at least 2/3 is devoted to discussion. The judgment will be based on the written report, the oral presentation and the discussion.
The aim of the exam is to evaluate if the candidate has the capacity to function at high level in a future environmental risk assessment job. This evaluation will also consider the five “Dublin Competence Descriptors” as guidance (see Annex 2).

For every candidate a tailored Graduation Examination Panel (GEP) will be assembled by the Registration Committee, consisting of:

- Three experts (in the subject of the internship report) with full voting right (not a member of Registration Committee)
  i. One expert from Academia
  ii. One expert from Business
  iii. One expert from Government

- Panel members with advisory vote
  i. The Registration Committee chair or his representative (chair of the examination panel)
  ii. One other Registration Committee member (secretary of the examination panel)
  iii. The mentor of the candidate
  iv. The internship provider or employer of the candidate (or his representative)

The justification for including two Registration Committee members (in an advisory role) in the examination panel of every candidate is to safeguard consistency among the evaluations across all candidates and to guarantee that the evaluation is in line with the overall aims of the certification programme.

The justification for including the mentor and the internship provider or employer in the examination panel in an advisory role is to enable transfer of additional relevant information to the voting jury members. If someone is not able to attend the meeting in person, possibilities for video conferencing or representation will be explored. If needed, the mentor and internship provider will be contacted before the meeting to obtain the relevant information and their advice.

Ultimately, the decision whether or not a candidate passes the exam and receives the registration as “SETAC Europe Graduate Environmental Risk Assessor” is made by the three external expert members of the panel, based on a 2/3 majority vote.

The decision (positive or negative) has to be documented with a written motivation, which will be communicated to the candidate shortly after the exam. A negative decision always needs to be accompanied with advice and recommendations to the candidate about specific aspects that need to be improved to enable a successful retake of the exam in the future.

Following a positive decision, the candidate will be invited to undersign a code of conduct. Following signature of the code of conduct, the GRA is allowed to carry the title of “SETAC Europe registered Environmental Risk Assessor Graduate” and the name of the GRA will be included in the SETAC Europe GRA register for a duration of five years.
In the case that it appears that a GRA has violated the code of conduct (or if the GRA was obtained based on false information), the Registration Committee may decide to withdraw the registration.

4. Becoming a SETAC Europe Registered Certified Environmental Risk Assessor

This process begins automatically when a candidate is registered as a Graduate Environmental Risk Assessor (see section 2).

At the earliest two years after the registration as a GRA, a GRA can submit an application for certification dossier containing following elements:

- Name and current affiliation of the candidate
- A motivation letter by the candidate, which includes at least the following points:
  i. a self-evaluation with an indication of why the candidate applies
  ii. a summary of past, current and envisaged future professional activities in environmental risk assessment
  iii. a statement about how the candidate envisages the aspects of his or her own commitment to continued education and training in the next five years
- A Curriculum Vitae of the candidate, clearly discriminating between the period before and after the graduation (in order to enable evaluation of progress since graduation).
- Proof of having worked a minimum of two years in an ERA environment (business or government) since registration as a GRA.
- Proof of commitment to continued training and education, by a statement in the motivation letter (see above) and also by means of providing proof of having participated (in the last two years) in at least one ERA related specialised course, summer school or training and at least one ERA-related symposium, workshop or conference (e.g. such as those organised by SETAC).
- A recommendation letter by the institution or company where the on-the-job training was performed.
- A total of three additional recommendation letters preferably (but not mandatory) one from academia, one from business, and one from government, preferably SETAC full members (as a proof of recognition by peers).

As mentioned above, in the context of “continued education”, the candidate needs to provide proof of having participated in at least one specialised course, training or summer school in the last two years. The followed course (or several courses combined) should be equivalent to at least 3 ECTS credits (5-10 days “total study load”). These courses can be selected from a list of registered courses approved by the Registration Committee or can be proposed by the candidate (pending approval by the Registration Committee). A specialised course (or training or summer school) should preferably have a close link with current practices in exposure, effects or risk assessment (integrating exposure, effect and risk). Such courses can focus on a specific legislation, a specific compartment and/or a specific chemical group and/or a specific organism group and/or specific ERA methods, e.g. related to the candidate’s current occupation. These courses should preferably focus on practical aspects (normally >50% of the time should be devoted to things such
as practical laboratory or field-work skills, hands-on calculations, computer calculations, use of specialised ERA-related software, etc.

Together with the submission of the “application for certification dossier”, a “certification fee” needs to be paid (see programme website for more information), before the dossier will be evaluated. This fee covers all administrative and organisational costs for the evaluation (further called judgment).

Each year, the Registration Committee will appoint an independent **Certification Judgment Panel (CJP)** composed of:

- 6 to 9 SETAC Europe members having voting right, two-three from academia, two-three from business and two-three from government. In order to ensure as much independence as possible. None of the voting CJP members should be member of the Registration Committee and preferably none of the voting CJP members should be a member of the Advisory Board or be voting members of the SETAC Europe council. The CJP composition should in terms of cumulative expertise preferably cover all nine topics described in Table 1. CJP members should either be CRA or have at least 6 years of experience with ERA or one or more of the ERA-related topics described in Table 1.
- The Registration Committee chair or his or her representative (advisory vote only, chair of the panel)
- One other Registration Committee member (advisory vote only, secretary of the panel)

The Certification Judgment Panel will convene three times per year (either physically or via conference call) to evaluate incoming dossiers of all candidates. This should allow most dossiers to be evaluated within four months from submission. The decision of granting the candidate with the title of “certified environmental risk assessor” will be made based on a **2/3 majority vote**. A valid voting can only be organized if a quorum of at least 50% of the voting CJP members is reached (abstentions do not count in determining if the quorum is reached).

The candidate will be judged on the basis of:

- His or her knowledge and the capacity to use this knowledge in environmental risk assessment
- His or her compliance with the GRA competences as described in Annex 1 (topic specific competences) and Annex 2 (programme wide competences, “Dublin Descriptors”).
- The “progress” made since “graduation” and during the on-the-job training with respect to his or her level of knowledge, understanding, skills and competences relative to what is expected from a GRA. It will therefore normally be expected that the CRA has more advanced/specialised knowledge than a GRA in at least 2 of the 9 topics (as listed in Table 1 and Annex 1) and that the CRA also has a further advanced his or her competence level than a GRA with respect to the Dublin Descriptors (Annex 2).

Taking into account the guidance above, the CJP will perform a global evaluation based on all elements provided in the dossier, such as:

- Recommendation letter(s)
- Motivation letter and Curriculum Vitae
- Commitment to continued education and training
- Quantity and quality of work performed as evidenced by, for instance, scientific publications, risk assessment reports, presentations at conferences, participation (e.g. invited) to workshops or other expertise groups

Following a positive decision, the candidate will be informed as soon as possible and will be invited to undersign a code of conduct. Following signing the code of conduct, the candidate will be registered as “SETAC Europe Certified Environmental Risk Assessor” for five years and will be allowed to carry this title. A negative decision must always be accompanied with a clear motivation and recommendations for improvement of the dossier to enable the candidate to succeed in a future application.

In the case that it appears that a CRA has violated the code of conduct (or if the CRA was obtained based on false information), the Registration Committee may decide to withdraw the registration.

5. How to apply for direct registration as a Certified Environmental Risk Assessor

As mentioned already in the introduction, in addition to the standard procedure to become a CRA, candidates can also apply for immediate direct registration as a CRA via the submission of a dossier for direct registration, when they fulfil all of following criteria:

- They must be able to clearly argument and demonstrate that they have already obtained all competences of a GRA and a CRA (Annex 1 and 2)
- They must have at least 2 years of on the job experience in an ERA job
- They must demonstrate commitment to continued education and training in ERA, by regularly participating in activities such as specialised courses, trainings or summer schools and symposia, workshops or conferences in the field of ERA.
- They must submit a concise written risk assessment report and succeed for the final graduation exam (same requirement as for a GRA). The submission of such a report and the GRA exam can be waived only for candidates with at least 10 years of ERA job experience, based on a written argumentation and motivation by the candidate.

The dossier for direct registration to be submitted should contain all of the following elements:

- Name and current affiliation of candidate
- A full Curriculum Vitae of the candidate
- Copies of relevant diploma’s (English transcripts can be asked by the CJP if needed for the evaluation)
- A motivation letter by the candidate, including
  i. a self-evaluation with an indication of why the candidate applies
  ii. a summary of past, current and envisaged future professional activities in environmental risk assessment
  iii. a statement about how the candidate envisages the aspects of his or her own commitment to continued education and training in the next five years
  iv. a clear argumentation that he or she already has obtained all competences of a GRA and CRA (Table 1 and Annexes 1 and 2). This will need to include a point-by-point ‘waiving’ of all topics described in Table 1, based on demonstrable evidence in the Curriculum Vitae (e.g. courses followed in the past, Ph.D. thesis, reports or publications authored, etc.)
- Proof of having worked a minimum of two years in an ERA environment (business or
government) during the last four years.
- A recommendation letter by an institution or company where the candidate has recently
conducted an ERA job.
- Proof of previous commitment to continued training and education at least by means of
providing “certificates of attendance” for having participated (in the last two years) in at
least one ERA related specialised course, training or summer school and at least one ERA
related symposium, workshop or conference (such as those organised by SETAC).
- A total of three recommendation letters preferably one from academia, one from
business, and one from government and preferably all SETAC members (as a proof of
recognition by peers). Deviations due to e.g. conflict of interests are possible but should
be motivated in the motivation letter.
- A concise, yet scientific and critical, environmental risk assessment report of recent work
performed in an ERA job (in the last two years) (for further evaluation during the GRA
examination, except in cases where a candidate with >10 years ERA experience can
substantially motivate why he or she should not undergo the exam). The report should be
written as a scientific document, and include sections such as:
  i. introduction, background, scope, aims
  ii. materials and methods (exposure, effects, and risk assessment)
  iii. results (exposure, effects and risk assessment)
  iv. a critical discussion, including the appropriateness of methods used or guidelines
     followed and recommendation(s) for their improvement
  v. conclusions & recommendations
  vi. list of cited references.

The report will not only be judged in terms of its timelines, i.e. being scientifically up-to-date with
current methods in exposure, effects and risk assessment, but also in terms of the critical
evaluation and discussion of these methods.

Any deviations from this prescribed list of elements should be motivated in the motivation letter.

Dossiers for direct registration must be submitted to the Registration Committee to check for
eligibility and to decide on any requests for waiving the GRA exam. The option of waiving the GRA
examination is intended to be in effect for a limited period of time and the end of this period will
be announced 6 months in advance on the CRA website.

Together with the submission of the dossier a “direct certification fee” needs to be paid (see
programme website for more information), before the dossier will be evaluated. This fee covers
all administrative and organisational costs for the dossier evaluation (further called judgment).

In cases where the candidate needs to undergo and pass the GRA exam (in front of the GEP), the
same regulation for the organisation of the exam apply as described in section 3. Such candidates
can only become CRA when they have also successfully passed the GRA exam.
The final decision on the direct certification of such a candidate (i.e. registration as a CRA) is made by the Certification Judgment Panel, according to the same standards as those applied for CRA candidates who have followed the standard programme (i.e. considering the same competence requirements described in Annexes 1 and 2. The decision of granting the applicant with the title of “certified environmental risk assessor” will be made based on a 2/3 majority vote. A valid voting can only be organized if a quorum of at least 50% of the voting CJP members is reached (abstentions do not count in determining if the quorum is reached).

Following a positive decision, the candidate will be informed as soon as possible and will be invited to undersign a code of conduct. Following signing the code of conduct, the candidate will registered as SETAC Europe Certified Environmental Risk Assessor for five years and will be allowed to carry this title. A negative decision must always be accompanied with a clear motivation and recommendations for improvement of the dossier to enable the candidate to succeed in a future application.

6. How to remain a certified risk assessor

The registration as a CRA is valid for 5 years. CRAs who wish to remain registered in the CRA database will need to renew their registration. All details of the renewal procedure will be worked out in detail soon. However, an important principle will be that in order to remain registered as a CRA, the CRA needs to maintain competences and use them at a high-quality level to the benefit of the field of ERA, remain active in ERA (including recognition by peers), and show commitment to continued education and training (e.g. SETAC activities).
Annex 1 Detailed descriptions of 9 Environmental Risk Assessment topics and associated competences to be acquired to become a Graduate Environmental Risk Assessor

Below, with every topic (as in Table 1 of the main document) a list of ‘subtopics’ is provided. It is expected that the required competence level can be reached by following a course that equals between 5 and 10 days of “total study load” (3 ECTS credits) and that covers about 75% of these subtopics. Competence levels to achieve (also called ‘attainment levels’ in some educational programmes in Europe) are described below every topic.

This Annex is meant to provide guidance to:

- Applicants / candidates to propose courses to be followed or to waive certain topics from the list in Table 1 in the main document
- Potential course organisers to assess whether their existing course could fit in the programme
- Course organisers and instructors to allow an evaluation (e.g. by an exam) of candidates (course attendance) to check whether or not the candidate has acquired the competences described under each topic
- The Registration Committee to decide about applicants’ and candidates’ proposals and to evaluate if courses can be included in the SETAC Europe database of registered courses for Certification of Environmental Risk Assessment.

Each course should have well-defined training objectives or attainment levels. Whether the objectives of a specific course have been achieved can be determined by an exam (written or oral) or a task to be fulfilled (e.g. writing an essay, giving a presentation). Both the exam and the task should be a good reflection of the objectives. It is up to the course organisers to define the objectives of the course and to come up with an appropriate method of examining whether the students have obtained the knowledge and acquired the skills needed to meet these objectives.

For students to achieve the competences associated with a topic, it is sufficient to have passed the exams or fulfilled requirements of one or more individual courses that fit in a topic, provided the courses together meet most aims of the topic (~75%). The latter can be judged based on the attainment levels and competence descriptions set for each topic. These attainment levels should provide a clear guidance on what knowledge and skills should be acquired. It is up to the Registration Committee to decide which courses or combination of courses are sufficient to meet these attainment levels.

1. Basic ecology concepts, principles and processes
   a. Populations, meta-populations, communities
   b. Species interactions (competition, predation, symbiosis, …)
   c. Interaction of species with their abiotic environment (light, nutrients, …)
   d. Habitat and niche
   e. Micro- and macro-evolutionary processes
   f. Ecosystem functioning and stability
   g. Biodiversity
   h. Redundancy, resilience

Description of associated competences:
Upon completion of this topic, the SETAC Europe Registered Graduate Environmental Risk Assessor:

- Has a basic understanding of principles and processes governing interactions between organisms and their biotic (intra- and inter-species) and abiotic environment;
- Has a basic understanding of the hierarchical organisation, dynamics, structure, functioning and (bio)diversity of populations, communities and ecosystems;
- Has a basic knowledge of the methods used for studying ecological processes;
- Is able to communicate orally and written about basic ecological principles using scientifically accurate terminology.

2. Introduction: basic concepts and principles in regulatory ecotoxicology and environmental risk assessment and legislative frameworks

a. The risk assessment paradigm: hazard – exposure – effects – risk
b. Role of various scientific disciplines needed for science-based risk assessment:
   analytical chemistry, ecology, physiology, statistics, (eco)toxicology
c. Human vs. Ecological Risk Assessment
d. Prospective vs. Retrospective Risk Assessment
e. Risk Assessment vs. Life Cycle (Impact) Assessment
f. Laboratory vs. field studies
g. Epidemiological vs. experimental studies
h. Spatial, temporal and biological scales of effects
   i. Broad comparative overview of chemical groups and classes and related existing European legislation and regulatory frameworks (and comparison with local/national, non-European or global legislation)
j. Critical comparison of different chemical groups and why they require different approaches / legislation
k. Overview of major legislative frameworks (e.g., REACH, WFD, GHS, Plant Protection Products, Pharmaceuticals)

Description of associated competences:

Upon completion of this topic, the SETAC Europe Registered Graduate Environmental Risk Assessor:

- Has a basic understanding of principles and concepts of the environmental risk assessment of chemicals;
- Has a basic understanding of methods and models used for the environmental risk assessment of chemicals;
- Has a basic knowledge of the main legislative frameworks for the environmental risk assessment of chemicals, the main institutions involved at the European level and their roles and competences;
- Has a basic understanding of the main factors and (types of) information required for assessing the environmental risk of chemicals;
- Is able to communicate orally and written about the basic principles of environmental risk assessment of chemicals, using scientifically accurate terminology.
3. Environmental Chemistry: fate of chemicals in the environment

a. Chemical transport (within and between compartments, short- and long-range)
b. Chemical distribution within compartments: (equilibrium) partitioning,
   fractionation and speciation (e.g., adsorption)
c. Chemical transformation (including biodegradation, hydrolysis,...) and relation to
   evaluation of persistence
d. Environmental conditions and chemical properties that influence these processes
   for various classes of chemicals
e. Analytical methods for analysis of various types of chemicals in different
   compartments (including principles about clean sampling, blanks, detection
   limits)
f. Comparative overview of processes of importance for a variety of chemical groups
g. Basics of measuring (standard tests), calculating and modelling these processes

Description of associated competences:

Upon completion of this topic, the SETAC Europe Registered Graduate Environmental Risk
Assessor:

- Has a basic knowledge of the main processes determining the fate and distribution of
  chemicals in the environment;
- Has a basic knowledge of the main environmental and chemical factors governing the fate
  of chemicals in the environment;
- Has a basic knowledge of the experimental methods and models used to determine and
  predict the fate of chemicals in the environment;
- Has a basic knowledge of experimental methods and analytical tools available for assessing
  environmental concentrations of chemicals, their potential use and limitations, and their
  application in monitoring;
- Is able to communicate orally and written about the basic principles of the environmental
  fate of chemicals, using scientifically accurate terminology.

4. Environmental Chemistry: exposure estimation of chemicals in the environment

a. Emission estimation (environmental sources of chemicals)
b. Overview of available monitoring databases and how to evaluate their quality and
   usefulness
c. Understanding and use of exposure models (including internationally accepted
   software) to estimate concentrations of chemical in different compartments (in
   case no measurements are available)
d. Internal exposure: bioaccumulation, biomagnification, food chain transfer,
   secondary poisoning (including basic modelling and calculations)
e. Environmental conditions and chemical properties that influence external and
   internal exposure (including bioavailability concepts)
f. Comparative examples of various chemical classes and related legislations

Description of associated competences:
Upon completion of this topic, the SETAC Europe Registered Graduate Environmental Risk Assessor:

- Has a basic understanding of environmental modelling approaches available to estimate the distribution of chemicals in the environment and to estimate exposure;
- Has a basic understanding of the concepts, processes and factors governing the bioavailability, uptake and internal distribution in organisms, and the food-chain transfer of chemicals, and the models used to describe or predict these processes;
- Is able to communicate orally and written about the basic principles of the exposure assessment of chemicals, using scientifically accurate terminology;

5. Sub-organism level (eco)toxicology (mechanistic toxicology): molecular, cellular, biochemical and physiological effects and biomarkers

a. Uptake, biotransformation, detoxification, bioactivation, elimination pathways of different classes of chemicals
b. Influence of chemical properties and environmental conditions on these processes
c. Interactions of chemicals with biomolecules (molecular effects)
d. Effects on DNA (genotoxicity, mutagenicity)
e. Cellular effects (e.g., oxidative stress)
f. Physiological effects (e.g. energy metabolism, ion homeostasis)
g. Toxicity pathways, adverse outcome pathways (from molecular initiating event to organism level endpoint)
h. Comparative, illustrative examples of selected compounds for selected important well-documented toxicity pathways (narcosis, endocrine disruption, acetylcholine-esterase inhibition)
i. Development and application of commonly used biomarkers (e.g., metallothioneins, EROD) together with their possibilities and limitations
j. Introduction to next-generation high throughput methods (e.g., “omics” such as transcriptomics, in vitro assays, standard methods, possibilities and limitations)

Description of associated competences:

Upon completion of this topic, the SETAC Europe Registered Graduate Environmental Risk Assessor:

- Has a basic knowledge of different pathways and processes of uptake and internal processing of chemicals in organisms and the chemical and environmental factors involved;
- Has basic understanding of the different types of interaction of chemicals with receptors and the resulting effects at the below-individual and individual level;
- Has basic knowledge of the different mechanisms and modes of action of major groups of chemicals;
- Has a basic understanding of modern omics (e.g., genomics, transcriptomics, proteomics, metabolomics) techniques and other methods for assessing the potential effects of chemicals on organisms;
- Has basic understanding of the application of the knowledge on below-individual level effects in monitoring, e.g. in biomarkers, and their limitations;
- Is able to communicate orally and written about the basic principles of mechanisms and modes of action of chemicals, its assessment and its use in monitoring, using scientifically accurate terminology;

6. Organism-level ecotoxicology
   a. Experimental design of ecotoxicity assays as described in international test guideline systems (e.g. OECD, ISO), standard tests and test organisms for various compartments, including
      i. Acute vs. chronic testing
      ii. Types of exposure systems (static vs flow-through, single-species vs multispecies, single-generation vs. multigeneration)
      iii. Dose (or concentration) and time response concepts and basic statistical analysis
      iv. Quantal vs. continuous endpoints
   b. Variation of sensitivity between individuals and between species (and building and interpretation of species sensitivity distributions)
   c. Concepts of mixture toxicity
   d. Combined and interactive effects of chemical and non-chemical (including natural) stressors
   e. Alternatives to animal testing (in vitro, QSAR, read-across, extrapolation between species and compounds)
   f. Overview of available ecotoxicity databases and how to use them (e.g. USEPA ecotox database, REACH)

Description of associated competences:
Upon completion of this topic, the SETAC Europe Registered Graduate Environmental Risk Assessor:
   - Has a basic knowledge of the available and standardized experimental methods and test systems for assessing the toxicity of chemicals to different organisms representative of different environmental compartments;
   - Has basic understanding of mathematical and statistical methods for analysing dose-response relationships and other data resulting from toxicity tests, and their limitations;
   - Has a basic understanding of the concepts of mixture toxicity and the interaction of chemical and non-chemical stressors;
   - Has basic knowledge of models to generate toxicity data based on chemical properties and on available databases, and is capable of properly judging the reliability and quality of the produced or available data;
   - Is able to communicate orally and written about the basic principles of toxicity testing and the methods used for analysing toxicity data, using scientifically accurate terminology;

7. Supra-organism level ecotoxicology or “Chemical Stress Ecology”: effects of chemicals at population, community, ecosystem and landscape-level
a. Basic ecology principles and concepts relevant for “ecological” effects of chemicals: populations and communities, structure and function, resilience, redundancy, stability, recovery, evolutionary aspects

b. Supra-organism level tests and their analysis and usefulness in regulation (e.g. microcosm, mesocosm, field enclosures)

c. Important population-level processes (e.g. density-dependence) and community-level processes (e.g. species interactions) for effects of chemicals

d. Evaluation of indirect effects on communities, ecosystems and metapopulations (landscapes)

e. Extrapolation from organism-level endpoints to populations (e.g. with population models)

f. Principles of trait-based risk assessment (including phylogenetic approaches)

g. Basics of ecological modelling in risk assessment

Description of associated competences:

Upon completion of this topic, the SETAC Europe Registered Graduate Environmental Risk Assessor:

- Has a basic knowledge of experimental methods and test systems for assessing the toxicity of chemicals at higher levels of biological organisation, such as populations, communities and ecosystems;

- Has basic understanding of the ecological processes and interactions involved in the occurrence of population, community and ecosystem level effects, and the way this may lead to direct and indirect effects;

- Has a basic understanding of the concepts and principles of ecological modelling that may be applied to assess direct and indirect effects at the level of populations, communities and ecosystems based on knowledge of the toxicity of chemicals at the individual level;

- Is able to communicate orally and written about the basic principles of determining and predicting the effects of chemicals on populations, communities and ecosystems, using scientifically accurate terminology;

8. Retrospective risk assessment: chemical and bio-monitoring of exposure and effects

a. The role of monitoring in various legislative frameworks related to chemical safety and environmental quality

b. Overview of existing databases and how to critically make use of them

c. Principles of sampling design

d. Overview of most important analytical methods for various components; Analytical methods for analysis of various types of chemicals in different compartments (including principles about clean sampling, blanks, detection limits)

e. Biological or Ecological monitoring methods and ecological quality assessment scoring systems (e.g. TRIAD approach).

f. Development/use of biomarkers of exposure and effect (overview, possibilities, limitations)

g. Development/use of biosensors and in-situ exposure systems
h. Correlation vs. cause in field-based assessments (i.e. how to determine effect of chemicals in a multi-stress environment)
i. Design of appropriate monitoring campaigns / schemes for inferring cause-effect

Description of associated competences:
Up on completion of this topic, the SETAC Europe Registered Graduate Environmental Risk Assessor:
- Has a basic knowledge of experimental methods and tools available for monitoring the environment for potential (post-registration) effects of chemicals, including the assessment of waste streams (e.g. effluents) or contaminated land, their application and their limitations;
- Has basic understanding of the legislative frameworks at the national and European level for environmental monitoring and environmental quality and chemical safety assessment;
- Has a basic knowledge of experimental methods and analytical tools available for assessing environmental concentrations of chemicals, their potential use and limitations, and their application in monitoring;
- Is able to communicate orally and written about the basic principles of chemical safety and environmental quality assessment, using scientifically accurate terminology;

9. Statistics for ecotoxicologists and environmental risk assessors
a. ANOVA and regression analysis (i.e. for NOEC and ECx calculation)
b. Dose-response analysis
c. Time-to-event models
d. Data complexity reduction techniques: multivariate statistics, ordination, principle component analysis
e. Outliers and below detection limit issues
f. Species sensitivity distributions (SSD) and chemical exposure distributions
g. Basics of probabilistic methods (variation vs. uncertainty)
h. Basics of ecological modelling methods for effect assessment

Description of competence:
Upon completion of this topic, the SETAC Europe Registered Environmental Risk Assessment Graduate:
- Has a basic knowledge and understanding of available mathematical and statistical tools for analysing ecotoxicological data, including laboratory, mesocosm or (semi-) field toxicity data, monitoring data and toxicokinetic data;
- Has a basic understanding of statistical and probabilistic methods used for estimating the risk of chemicals, and their limitations.
- Has a basic understanding of ecological models used for effects assessment, their applications and limitations;
- Is able to communicate orally and written about the basic principles of the use of mathematical and statistical methods in the environmental risk assessment of chemicals, using scientifically accurate terminology;
Annex 2 “Dublin Descriptors” describing competences and attainment levels to be acquired by Graduate Environmental Risk Assessors (GRA) during the entire training programme

Competences and attainment levels for the entire programme define requirements to be met by SETAC Europe Registered Graduate Environmental Risk Assessors (GRA). The descriptions follow the system of “Dublin descriptors” used for evaluating higher education in Europe. Different types of descriptors are distinguished: Knowledge and understanding, Application of knowledge, Critical judgment, Communication, and Learning. To enable fitting these descriptors to the entire programme, they are fairly general. To achieve this, the attainment levels have been limited to just one main sentence per descriptor and a few more detailed sentences. For the descriptor “Knowledge and Understanding” the detailed sentences are equivalent to even more detailed competence descriptions per topic as provided. These detailed objectives (as in Annex 1) will already be achieved by the candidate by taking the individual courses (in case of a positive evaluation by the course organiser). However, a few general overarching points (i.e. across the various topics of Annex 1) have been added for completeness. The other four descriptors ensure that competences to be acquired go beyond merely having obtained knowledge and understanding. In this context, the Dublin Descriptor competence levels are to be gained from more than just following course, notably the obligatory internship as defined in the programme, but also from on-the-job experience. The Dublin descriptor competence levels will form an important basis of the evaluation during the GRA exam.

This Annex is mainly meant to provide guidance to:

- Applicants / candidates to know about the competences (beyond knowledge) that are required from them to become GRA’s and thus to seek appropriate courses, training, and an internship provider, and also to prepare for the GRA exam.
- The Graduation Examination Panel to decide whether or not a candidate passes the GRA exam.

Dublin descriptor 1
Knowledge and understanding: The GRA has a basic but broad theoretical and practical knowledge and understanding of Environmental Sciences, notably within the field of environmental risk assessment, and of the underlying and supporting fields.

The GRA

• has a basic understanding of ecology, more specific of principles and processes governing interactions between organisms and their biotic (intra- and inter-species interactions) and abiotic environment, and of the hierarchical organisation, dynamics, structure, functioning and (bio)diversity of populations, communities and ecosystems;
• has basic understanding of the concepts and principles in regulatory ecotoxicology and environmental risk assessment
• has basic understanding of the existing legislative frameworks in Europe and the main actors in the field of environmental risk assessment
• has basic understanding of the main factors and processes governing the fate and distribution of chemicals in the environment;
• has basic understanding of the factors, processes and concepts used to translate knowledge on the fate of chemicals into an exposure assessment;
• has basic understanding of the modes of action of major groups of chemicals and of (eco)toxicological concepts and theory;
• has basic understanding of methods for assessing (eco)toxicological effects at different levels of biological organisation, including their standardisation;
• has basic understanding of the linkage between ecology and ecotoxicology and its use to describe/predict and determine effects at higher levels of biological organisation;
• has basic understanding of the concepts and tools used for predictive and diagnostic ecotoxicological effects assessment;
• has basic understanding of the statistical and mathematical tools used for analysing (eco)toxicological data;
• is able to think in multidisciplinary terms, and possesses an understanding of other disciplines (and sub-disciplines) that are of importance to environmental risk assessment.

Dublin descriptor 2

Application of knowledge: The GRA is able to apply scientific knowledge to problems arising in the context of environmental risk assessment.

The GRA:
• is able to apply his/her scientific knowledge to environmental risk assessment problems;
• is able to apply his/her scientific knowledge to identify weaknesses and define uncertainties in the different steps of an environmental risk assessment;
• is able to contribute to knowledge transfer to policy and risk management;

Dublin descriptor 3

Critical judgment: The GRA should be able to independently and critically judge information.

The GRA:
• is able to independently acquire, analyse and critically evaluate information on the potential risk of chemicals in the environment;
• is able to select and order information, to distinguish essentials from trivialities, and to make associations;
• is able to independently and critically analyse environmental research, both in relation to its design and performance, and to the results obtained;
• has the ability to evaluate his/her own performance, both introspectively and in discussion with others.

Dublin descriptor 4

Communication: The GRA should be able to transfer knowledge and skills related to his/her subject area to other persons and to adequately reply to questions and problems posed in environmental risk assessment and related topics.

The GRA:
• can communicate orally and written about such basic principles of environmental risk assessment and its supporting fields using scientifically accurate terminology;
• can report orally on issues of environmental risk assessment, in English, with support of modern presentation techniques;
• can report in written form on issues of environmental risk assessment on the level of peer-reviewed academic journals (in English);
• can make valuable contributions to scientific discussions about issues of environmental risk assessment, including plans for (experimental) research;
• can collaborate with scientists from different disciplines when needed.

Dublin descriptor 5

Learning skills: The GRA has learning skills that enable him/her further (self)education and development within environmental risk assessment.

The graduate:
• is able to understand and summarise scientific literature on environmental risk assessment and related/supportive fields of science;
• is familiar with general scientific journals relevant to the field of environmental risk assessment and its supportive fields of science (including ecotoxicology, environmental chemistry, ecology, environmental monitoring, risk assessment, etc.);
• is familiar with computer software that is relevant to the field.