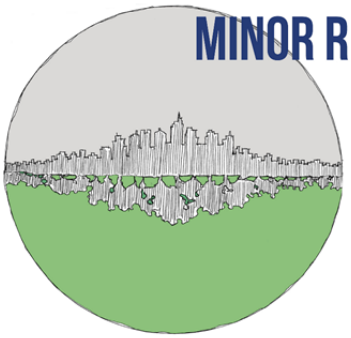

LDE minor Responsible Innovation

Study Guide 2015 - 2016

Course ECTS	15 ECTS for Erasmus and 30 ECTS for Leiden & Delft
Education period	Q1 of academic year 2015 – 2016 for Erasmus and Q1 and Q2 of academic year 2015 – 2016 for Leiden & Delft
Education Method	Group and Individual assignments, Student Project Group assignments, plenary presentations, self-study of selected literature and video clips
Programme code	WM-Mi-180-14 (TU Delft)

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Content

1. Introduction

Successful companies innovate and innovation can bring a lot of good to society, but it may harm as well. The challenge is to innovate in a responsible way: beneficial both to business and society. Then many stakeholders and many aspects have to be addressed so an interdisciplinary approach is needed. In this minor we combine the unique knowledge and skills of the three universities of Leiden, Delft and Rotterdam. Each university contributes its own specific focus and expertise on Responsible Innovation. The students and teachers come from the different universities, and bring with them specific knowledge and perspectives from their universities.

The integrative focal point of this minor are the Student Project Groups (SPGs) which are mixed groups of 4-6 students coming from the three universities, tutored by academic coaches and their target stakeholder. In the SPG, the student will apply the Intervention Cycle (elaborated in chapter 2) to a real life case of innovation. At the end of each quarter, there will be a plenary seminar where the groups will present their results to fellow students, coaches and the target stakeholder. The SPGs are formed during the first integration seminar, also known as the Kick-off day of the minor. In addition to the SPGs, there are six Thematic Modules (chapter 3).

The minor is intended for students who are passionate about understanding dilemmas in responsible innovation. The minor encourages students to think about the people, planet and profit aspects of potential innovations. The following common features describe our target group: – Societally conscious: you have a vision to understanding dilemmas in responsible innovation; – Entrepreneurial spirit: you are open minded with a flexible and proactive attitude; – Value-driven: you have a wish to contribute to financial, ecological and social sustainability. We are looking for a high diversity of interests and backgrounds, in order to have strong cross-disciplinary teams with higher and more effective innovation capacity!

1.1 Learning goals, teaching activities and assessments

During this minor you will be introduced to the technical, managerial and socio-economic principles that govern innovation, and discuss the ethical and other conditions for innovating responsibly. You will learn how responsible innovation can be defined and analysed; how it can be done and managed at the level of a project team, of a company, and of an entire economic system; and how it can be promoted and irresponsible innovation avoided. You will learn to work on these issues in an interdisciplinary team. All activities and assignments for the entire minor will be carried out in English.

1.2 Schedule

This minor is a full-time programme for a full quarter (15 ECTS) or semester (30 ECTS). Students must thus be available to attend at all sessions, including the plenary seminars. Thematic modules will take place at the university that is responsible for the module. An integrative seminar takes place at the university that organises it.

Minor schedule overview

In the chart below, you will find an overview of the minor. A more detailed, weekly schedule can be found on CourseSites.

Month	Week	Dates	Activities
September	1.1	31/8-4/9	Kick-off
	1.2	7/9-11/9	Lectures
	1.3	14/9-18/9	Lectures
	1.4	21/9-25/9	Lectures
October	1.5	28/9-2/10	Lectures
	1.6	5/10-9/10	Lectures

	1.7	12/10-16/10	Lectures
	1.8	19/10-23/10	Lectures
	1.9	26/10-30/10	Limited lectures (deadline report)
November	1.10	2/11-6/11	Presentations SPGs (exam week)
	2.1	9/11-13/11	Start quarter 2
	2.2	16/11-20/11	Lectures
	2.3	23/11-27/11	Lectures
December	2.4	30/11-4/12	Lectures
	2.5	7/12-11/12	Lectures
	2.6	14/12-18/12	Lectures
	Christmas and New Year		
January	2.7	4/1-8/1	Limited lectures
	2.8	11/1-15/1	Lectures
	2.9	18/1-22/1	Limited lectures (deadline Report)
	2.10	26/1-29/1	Presentations SPGs (exam week)

Note: Blank weeks or lecture free weeks are normally scheduled as self-study or preparation week for the exams, usually this means an empty week. However, the six thematic modules can still have specific timeslots and the SPG workshops/feedback meetings can still be scheduled in these blank weeks. The reason for this is that the minor as a whole has few exams and mostly (group) assignments. The integral SPGs will have 2-3 weekly assignments that are mandatory for obtaining the final grade of the minor. The students conclude their work with quarterly end presentation to defend their past quarterly work The 6 Thematic Modules take place at the respective universities that are responsible for them. Each Integrative Seminar takes place at the university that organises it.

The minor is a full-time programme for a full quarter (15EC) or semester (30EC). Students must thus be fully available to attend all sessions, including the plenary seminars. To pass the minor, it is required to pass all thematic modules and the SPG.

A detailed and up to date schedule of the Minor is located on Coursesites page under "Schedule". Dates for plenary seminars are: November 2nd and January 26th. Location will be announced during the first week.

First quarter daily schedule: (schedules may still vary week to week)

Monday: workshops on September 7th and 21st in Delft

Tuesday: Leiden (evening)

Wednesday: Delft (afternoon)

Thursday: Erasmus (morning)

Friday: Free

Second Quarter daily schedule:

Monday: workshops November 16 and 23rd in Delft

Tuesday: Delft (morning)

Wednesday: Free

Thursday: Leiden (morning or afternoon)

Friday: Rotterdam (afternoon).

2. Student Project Groups (SPG's)

The SPGs will be the integral part of the minor, here the students will deal with the complexity of a real life case in groups through the Intervention Cycle that consists of six stages. The SPGs will be guided with workshops and weekly feedback moments.

2.1 Introduction

The Intervention Cycle consist of 6 stages: Problem Identification, Problem Analysis, Problem Definition, Solution (Re)Design, Solution Implementation and Solution Evaluation. Students will cover the entire cycle during the quarters. The results will be presented during the plenary sessions at the end of the first and second quarter (week 10 and week 20).

At the end of the learning experience you can demonstrate understanding of the intervention cycle by applying the framework to a specific case of responsible innovation by working in an interdisciplinary team. This includes:

1. Applying practical and theoretical knowledge to papers and presentations; and
2. Reflecting on teamwork and team decision making processes.

2.2 Coach and target stakeholder

To help you achieve the learning goals you have (bi)weekly coaching and feedback sessions with one of the teachers who will be your coach. Your SPG is in the lead, so make sure you make an appointment with your coach. Be assertive! Next to these (bi)weekly session you are in contact with your target stakeholder. The target stakeholder will be available for an interview and for feedback. The SPG is responsible for organising and maintaining its contacts with the target stakeholder, but you should consult your coach before contacting the target stakeholder and you should keep your coach informed about your interactions with the target stakeholder.

2.3 Workshops

An important part of the minor are the plenary workshops These workshops are organised by the course managers and cover two themes:

1. Analysing: covering the first two stages of the Intervention Cycle (Problem Identification and Problem Analysis).
2. Development**:** developing abilities, such as collaborative work, writing, or creative thinking, that are crucial for carrying out the activities in the SPGs.

Every quarter three workshops will be organised. Attendance is compulsory.

2.4 Interdisciplinary group work

One of the unique points of this minor is the interdisciplinary group work. It will probably be the first time that you work with students from different disciplines. Although it helps you to broaden your perspective on subjects, it also might be difficult; especially in the beginning. Therefore a workshop on this theme will be organised during the Kick-Off. Halfway the first quarter there will also be a lecture on interdisciplinary group work. During your (bi)weekly coaching sessions, your coach will not only discuss the progress but also support your SPG with the interdisciplinary group work.

2.5 The Intervention Cycle: the six stages

The Intervention Cycle consist of 6 stages: Problem Identification, Problem Analysis, Problem Definition, Solution (Re)Design, Solution Implementation and Solution Evaluation. Below you will find a description of each stage.

2.5.1 Problem Identification

In the Problem Identification stage, you identify the problem as it is perceived by the target stakeholder. How does he/she perceive the problem and why? This identification includes identifying the target stakeholders' perceived opportunities, but also the challenges and dilemmas he/she is facing.

Assignment:

The partial report (approximately 500 words) should include:

- A description of the problem as it is perceived by the target stakeholder, including the relevant history and background, the target stakeholders' perceived opportunities, challenges and dilemma's;
- A log showing which team member did what.

To be successful you should identify relevant (academic) literature and you should use relevant tools and a functional visualization. Relevant tools in this stage could be the five why's analysis, PESTEL analysis, macro meso micro analysis, Power/Interest Grid for Stakeholder Prioritization and brainstorming. You are free to use any other relevant tool.

Please note that the justification of the choices made, methodological approach, including methods used, research done and group activities are crucial.

2.5.2 Problem Analysis

In the Problem Analysis you have to delve deeper and broader into the target stakeholders' initial perspective. With deeper we mean that you should build up more understanding and more relevant background. This includes the identification and use of relevant scientific literature. With broader we mean that the analysis should go beyond the perception of the target stakeholder. The aim should be to identify all stakeholders, and to analyse their perspectives, values and interests, independent of the perspective of the target stakeholder. A stakeholder is any individual or group who has an interest (a "stake") in the problem, either as an actor (an "active stakeholder") or as someone who's values and interests will or may be affected (a "passive stakeholder").

There are several tools and methods available that can help you to look broader and deeper than the target stakeholders' initial perspective. In this stage a stakeholder analysis is required.

The first stage of the stakeholder analysis is to identify your stakeholders. Think of all the people who are affected by your subject, who have influence of power over it? Or have an interest in its successful or unsuccessful conclusion? And, how do they perceive the problem? Useful tools here are brainstorming or brain writing.

The second step is to classify the stakeholders. Some of the stakeholders may have the power either to block or advance. Some may be interested in what you are doing, others may not care. The interested stakeholders may support your position, oppose it, or be neutral. Map out your stakeholders and classify them by their power over your case and by their interest in your work. This power may be related to the solution for your problem (e.g. knowledge), to the process of developing this solution (e.g. authorities in the field), or the market acceptance of this solution.

The final stage of your stakeholder analysis is to get an understanding of what motivates the stakeholders and how you need to win them around. You can summarize the understanding you have gained about the stakeholders, so that you can easily see what you have to keep in mind while working on your case. After all, your innovation to solve the problem has to be a responsible one. Which means that ideally every stakeholder should be satisfied with your solution, or at least not harmed by it.

NB. An innovation can be called responsible if all (active and passive) stakeholders benefit from it, or if at least none of them feels negatively affected by it in one or another way.

Assignment:
The partial report (approximately 2000 words) should include:

- A complete list of (active and passive) stakeholders of the innovation that you have taken as your topic.
- A description of the values and interests of these stakeholders and a description of how these values and interests will or may be affected by the innovation.
- An analysis of the stakeholders in terms of not merely their interests but also their power to influence the innovation.
- An account of the scientific literature that you have identified and explored in order to deepen and broaden your understanding of the problem(s) that are associated with the innovation. What are the insights that you take away from that literature?

- A log showing which team member did what.

To be successful you should use relevant (academic) literature, tools and a functional visualization. Relevant tools in this stage could be SWOT analysis, Mendelow Power/Interest Matrix, Fishbone diagram and cause-and-effect tree. You are free to use any other relevant tool.

Please note that the justification of the choices made, methodological approach, including methods used, research done and group activities are crucial.

2.5.3 Problem Definition

The Problem Definition contains a description and a demarcation of the problem that you will try to solve in the later stages of the intervention cycle or the opportunities you see. The problem definition is informed by the results of the previous stages. A problem exists if there exists a state of affairs (or a trend, development, proposal, initiative) and (1) some of the stakeholders are dissatisfied with it or perhaps should be, and (2) there are reasons to believe that things can be improved. As a consequence of the work you did in the Problem Analysis stage, the problem definition will normally be both broader and deeper than the problem as it was identified in the Problem Identification stage.

A problem is not a given, but exists only in virtue of a choice made in the face of a 'problem mess'. In the Problem Definition stage you will have to take decisions regarding what you are going to focus on in the next stages and why. The problem definition is therefore a crucial part of the project and should be developed carefully. An important aspect of the problem definition is that it nor merely presents, but also provides a justification of the choices you make in this stage. Why focus on this particular (aspect of the) problem and not another one?

When you made a choice and justify it, you lay down the result in the problem definition. In general, a problem definition is a concise description of the issues that need to be addressed and why. A good problem definition should:

1. Define the problem in terms of needs, and not solutions. If the problem is defined in terms of possible solutions, you're closing the door to other, possibly more effective solutions.
2. Define the problem as one everyone shares; avoid assigning blame for the problem. This is particularly important if different people (or groups) with a history of bad relations need to be working together to solve the problem. You may relate the problem to one 'problem owner' (the target stakeholder in your case) but in any event you should also address other (active and passive) stakeholders, their values and interests, and how these may be affected. Remember that your goal is not just innovation but *responsible* innovation.

You should carefully define the key terms that occur in your problem definition.

An indispensile element of the problem definition is a formulation of the (re)design requirements. The design requirements apply to your specific problem definition and the product, service or system that you are designing. Your requirements will be more specific and directly related to meeting the needs of the stakeholders. You can think of functional requirements, user requirements, boundary conditions and design restrictions (see page 125; van Aaken, Berends and van der Bij). Make them as SMART and measurable as possible. Remember that without measurable design requirements, an evaluation of the success of the implemented design will be impossible.

Assignment:
The partial report (approximately 1000 words) that contains your problem definition should include:

- An overview (list) of all the actual and potential problems you identified in the preceding stages;
- A statement and demarcation of the problem (including an explanation of the key terms of the problem statement) that you will try to solve in the next steps;
- A justification of the chosen problem and how it is demarcated; Here and elsewhere in the problem definition, you must use relevant scientific literature that you have identified in the previous and the present stage;
- A list of (re)Design Requirements (including justification of the chosen requirements). NB. Not merely the intended outcomes must be specified (quantified if possible) but also unwanted but possible side-effects must be identified; also here, goals (quantified if possible) must be set.
- A log showing which team member did what.

To be successful you should use relevant (academic) literature, tools and a functional visualization. Relevant tools in this stage could be Means-End Diagram, Ofman Core Qualities … You are free to use any other relevant tool.

Please note that the justification of the choices made, methodological approach, including methods used, research done and group activities are crucial.

2.5.4 Solution (Re) Design

In the Solution (Re) Design stage you will design your solution to the problem that was defined in the preceding stage. The (re)design may refer to different types of entities, such as a physical product or service, but it could also be an organization procedure, a standard, a law or an agreement, or all combined.

The first step is generating ideas for possible solutions. There are various tools and literature available that address the creative processes that are needed throughout this step. The solution-ideas that you generate may only address certain aspects of the problem. Therefore you should group your solution ideas according to the parts/aspects of the problem that they would solve, so that a clear overview results.

As many possible solutions have been crossing the venue, you need to decide which solutions will fit your chosen problem definition and design requirements best. A multi criteria analysis (MCA) is a relevant tool to evaluate and rank your solution ideas. If you have several ideas per problem-aspect, then you might (also) use MCA to rank the ideas and select the best one. You should select a (set) of solution ideas for the next stage of the intervention cycle on the basis of the rankings. Important is that you justify the choices made.

You should clearly specify how the selected solution-ideas will realise the design requirements. If necessary, you should further detail the solution-ideas to make sure that, if implemented, they will indeed realise the requirements.

Assignment:
The partial report (approximately 2000 words) should include:

- An overview of the possible solutions ideas that you have generated, categorized by parts/aspects of the problem;
- An evaluation/ranking of the solution ideas using MCA;
- A justification of the chosen (set of) solution idea(s) that will be implemented in the next stage of the Intervention Cycle;
- A detailed specification of the selected solutions that demonstrates that and how the solutions will realise the design requirements.
- A log showing which team member did what.

To be successful you should use relevant (academic) literature, tools and a functional visualization. Relevant tools in this stage can be brain writing, brain storming, multi criteria analysis and Cost-Benefit analysis. You are free to use any other relevant tool.

Please note that the justification of the choices made, methodological approach, including methods used, research done and group activities are crucial.

2.5.5 Solution Implementation

In the Solution Implementation stage, the selected design(s) should be implemented. Due to limited time, resources and also because of your limited power, it will often not be possible to actually implement the solution. For instance, you do not have the means and power to introduce a new law or produce a new product. Rather than actually implementing the design(s), what you will do in this stage is to draw up a detailed plan that, if executed, would result into the actual implementation of the design(s).

You describe in detail which steps must be taken by whom in order to implement your solution(s). This is called an *implementation plan*. By checking whether the steps can actually be executed, you perform a sort of feasibility study. By detailing the steps that are necessary (and feasible), you provide a kind of proof that your design is possible/feasible.

In writing the implementation plan, you must take recourse to scientific literature. The literature may help you to assess whether all the steps are feasible).While writing the implementation plan, you may have to consider different implementation options.

You also have to advise the target stakeholder and the other stake holders how they should proceed with the implementation. This means that your implementation plan should not merely cover all steps that must be taken, but should also make clear who should take the steps, and give advice on how they could do that.

It is a possibility that you have to conclude that the implementation of your solution(s) is after all not possible, or that it is uncertain. When this is the case, you have to suggest alternative solutions, which means: going back to the (Re)design stage, or perhaps even to an earlier stage of the intervention cycle.

Assignment:
The partial report (approximately 2000 words) should include:

- A detailed implementation plan covering the different aspects of your solution (re)design;
- A brief description and justification of alternative solutions if the current stage has revealed that the implementation of your selected (re)design(s) is not feasible;
- A log showing which team member did what.

To be successful you should use relevant (academic) literature, tools and a functional visualization. Relevant tools in this stage are cause-and-effect tree (p. 80) and implementation plan. You are free to use any other relevant tool.

Please note that the justification of the choices made, methodological approach, including methods used, research done and group activities are crucial.

2.5.6 Solution Evaluation

The final step of the intervention cycle is the Solution Evaluation. Evaluation refers to the careful observation and assessment of the process and the effects of your innovation. An evaluation should tell whether a project is successfully completed, whether improvements need to be implemented and what can be learnt for the future.

Your evaluation should address four objectives:

1. **Evaluation to determine the results achieved and the improvements to be made**
   Here you should describe whether or not the implemented solution(s) meet the goals (e.g. design requirements) you stated earlier and whether unwanted effects have been avoided or limited or contained. Moreover, you should measure the stakeholders' satisfaction with the implemented solution, and take this as a measure of the effectiveness of the responsibility and fit for use of the solution, for instance by interviewing them or by organising a focus group meeting.
2. **Evaluation oriented towards learning for future problems in the same context**
   What successful actions are to be retained and what actions should be avoided in the future? So, what can be learned for dealing with future problems in the same context? To reflect, you have to look at your own activities from a distance. Reflection is enhanced by creating an external point of reference that can be used as a mirror or as a stance form which to view oneself or one's project. Your fellow SPGs will function as a mirror during a workshop.
3. **Scientific reflection**
   In this section you have to answer several questions. What has the scientific literature contributed to your work? Was it hard to find relevant scientific literature? How did you deal with it? How can this literature be positioned in terms of scientific disciplines? How did you combine the different angles to come to your advice? You also have to think about the scientific work you missed regarding your topic. Here you also have to address this gap, if any.
4. **Evaluation for personal and professional learning and development**
   Here you should describe what you as a group learned during the process. Moreover, you have to reflect critically on your functioning as a group. It will help identify strengths and weaknesses, uncover preferences for particular types of work and develop the ability to work with other people and manoeuvre in a social context. Did the variety of scientific backgrounds help or hinder?

Assignment:
The partial report (approximately 2000 words) should include:

- A post-test evaluation, including a list with the stakeholders and their (reasons for) (dis)satisfaction with the solution had the implementation plan been actually executed; Again, scientific literature may help to assess whether certain stakeholders would or would not be satisfied with outcomes;
- What has been learnt for future problems inthe same context?

- Scientific reflection;
- Critical reflection on personal and professional learning and development;
- A log showing which team member did what.

To be successful you should use relevant (academic) literature, tools and a functional visualization. Relevant tools in this stage include multi criteria analysis.

2.57 Overview of schedule for SPG's:

The following table represents the schedule for SPG's to work through the intervention cycle. Each SPGs will have to arrange with their coaches when each of the assignments above should be turned in and they must schedule a feedback moment with their coach.

P = Plenary meeting with Presentations
F = Feedback moment from coach

Week	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.ten	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	2.ten
1. Problem Identification			F							P		F								P
2. Problem Analysis				F						P			F							P
3. Problem Definition				F						P				F						P
4. Solution (Re)design						F				P						F				P
5. Solution Implementation								F		P								F		P
6 Solution Evaluation									F	P									F	P

2.6 Assessment and grading Student Project Group

Assessment forms (Appendix A and B) will be used to assess the quality of the assignments and the presentations. The criteria are used to give references to the students, where they need to work on at least. A higher grade is dependent on whether the SPGs can shows signs of a deep understanding of the case, mastering the used tools/literature or give sound reasoning and arguments for decisions made in each stage.

If you pass the SPGs, you will be rewarded with 6 ECTS in both quarters (12 ECTS in total). The report grade counts towards 5/6 of your final SPG grade. The presentations counts towards 1/6 of your final SPG grade. The final grade for the SPGs counts towards 2/5 of your final thematic modules grades. For example:

Grades 1st quarter:

Programme part	**Grade**	**Calculation**	**Final grade**
SPG – Report	7.5 (5/6)		
SPG – Presentation	7.0 (1/6)		
SPG – Final grade		((7.5*5)+(7.0*1))/6	7.4 (2/5)
Thematic module 1	6.3 (3/5)	((6.3*3)+(7.4*2))/5	6.7
Thematic module 2	7.8 (3/5)	((7.8*3)+(7.4*2))/5	7.6
Thematic module 3	7.1 (3/5)	((7.1*3)+(7.4*2))/5	7.2

Grade list 1st quarter:

Thematic Module 1	5 ECTS	6.7
Thematic Module 2	5 ECTS	7.6
Thematic Module 3	5 ECTS	7.2

3. Thematic Modules

In addition to the Student Project Groups, there are six Thematic Modules. Topics dealt with in the Thematic Modules (courses) include: introduction to responsible innovation and value sensitive design; corporate social responsibility; responsible systems innovations and interface management; responsible management of risk and safety; ethical, legal and innovation aspects of intellectual property; responsible bioscience and biotechnology, and management of the innovation process. Below are the descriptions of each module. The Thematic Modules will have their own specific passing requirements and schedules. These are managed by the respective module managers. More detailed information about the module and schedules can be found on Coursesites. Note: changes and updates from the module managers should be considered final.

3.1 Responsible Innovation. Introduction (TU Delft – 1st quarter)

Today, technology has become a main determinant of the quality of life of individuals and the quality of society. New technologies contribute to human well-being, but they may also introduce considerable risks to humans, the environment and future generations. We therefore have every reason to ascertain that the new technologies we develop as a society respect the values we hold dear. Various governments, companies and research funding agencies have now recognized this need for responsible innovation. Responsible innovation can, as a concept, be understood in a more substantive and in a more procedural sense. As a procedural notion, responsible innovation refers to a process of innovation that meets certain procedural norms, like accountability (to stakeholders and to society) and transparency. As a substantive notion, responsible innovation refers to a process of innovation which results in certain products, i.e. innovative technologies, which reflect important moral values. This includes values like, health, safety, human welfare, sustainability, justice, inclusiveness, democracy, privacy, trust, and autonomy.

In this course we will discuss the concept of responsible innovation and how it might be understood. We will discuss tools and approaches to responsible innovation, like Value Sensitive Design (VSD), Constructive Technology Assessment (CTA), Midstream Modulation (MM), and Network Approach for Moral Evaluation (NAME). We will address the possibilities and challenges for responsible innovation at four different levels: 1) the level of specific R&D projects, 2) the level of companies (and the relation between responsible innovation and corporate social responsibility (CSR), 3) the level of technological sectors and 4) the activities of governments and funding agencies.

Learning objectives

After this course, students should be able to:

- Provide and justify specific definitions of the notion of responsible innovation
- Explain approaches to responsible innovation such as Value Sensitive Design (VSD), Constructive Technology Assessment (CTA), Midstream Modulation (MM) and Network Approach for Moral Evaluation (NAME), and to apply these approaches to concrete cases and examples
- Relate responsible innovation to corporate social responsibility (CSR)
- Identify opportunities and challenges for responsible innovation at four different levels: 1) the level of specific R&D projects, 2) the level of companies, 3) the level of technological sectors and 4) the activities of governments and funding agencies.

Assessment

There is no test. Your grade for the course is based on your grade for the wiki essay. Completion of the assignments is required in order to obtain a grade for the course.

3.2 Innovation and Interface Management (Erasmus University Rotterdam – 1st quarter)

Using fuel cell technology, hydrogen can be used in cars as an alternative to petrol-based or electric cars. From a sustainability perspective this might be the better alternative but it would require an entirely new infrastructure with standard interfaces between the cars and the 'fuel' stations in this infrastructure. The possible new technology competes against existing ones, the question is how to measure environmental performance, serious safety issues apply, and companies compete with each other but also need a common solution in order to make things happen. So at the supply side we observe a dynamic process of cooperation and competition between a large variety of stakeholders which should result in products (or services) that will be accepted in the market while addressing societal needs, and for which shared interface specifications are essential. Interfaces link the different parts of the system and link the system to human beings. These interface specifications should remain stable during a longer time period, which allows innovations in other parts of the system, such as the cars. Increasingly, innovation is about integrated systems of products and services rather than single products or services and this course provides you with knowledge and skills on you how to manage such innovation projects.

Learning objectives

This course aims to provide you with basic knowledge about interface management and, next, its integration in innovation management. This should enable you to develop and employ a strategy for an individual company, a supply chain or a branch of business on how to manage product or service innovation in combination with interfaces. After this course you:

- understand the role of interfaces in complex systems of processes, products and services and in innovation of these;
- understand the role of standards to specify interfaces
- understand how involvement in standardisation enables companies to influence interface specifications in a multi-stakeholder setting
- are able to apply interface management to support innovation management
- are able to develop and employ a strategy on how to integrate innovation and interface management to enable responsible innovation

Assessment

For each of the assignments, individuals and groups will receive a grade (1-10). The final grade will be weighted average of the grades for the different asignments.

- Quality of involvement in class discussion (20%)
- Small individual assignments (30%)
- Assignment 2 – written report (40%)
- Assignment 2 – presentation (10%)

In the unfortunate case that your final grade is below 6, you have the opportunity to re-do or improve one or more assignments.

3.3 Big Data for Humanity (Leiden University – 1st quarter)

In this course you will focus on the subject of Data for Humanity. (Big) Data is currently used for intelligence (NSA) and for advertisement (Google adds), but can we utilize its potential for the social good.

Learning objectives

At the end of this course the participants will:

- have an understanding of the concepts of global citizenship, individual responsibility, collective responsibility, responsible innovation, and frugal innovation;
- be able to explain multifaceted dimensions of responsible innovation in a global context;
- be able to explain frugal innovation as a part of responsible innovation;
- be able to discuss, at a basic level, the legal, anthropological and business opportunities and constraints of frugal innovation, in writing;
- be able to build an argument and present it based on a case, in writing;
- have improved their skills of presenting, providing feedback, and of working in a team.

Assessment

The course consists of a number of weekly lecture videos, which are between 5 and 12 minutes in length (approx. 30 clips), by different experts. The video lectures contain 1-2 integrated quiz questions per video. Brief lecture notes will accompany each video segment.

There will also be exercises: an essay on negotiations and strategies of conflict resolution, and multiple choice questionnaires on substance covered in the lectures. Some assignments will be graded automatically (multiple choice), others assessed on the basis of peer-review techniques (essay).

The final exercise is an essay of 2000 words on the potential of Data for Humanity. You are asked to identify, analyse and reflect on the potential of a case study in one of the following fields: Disasters, Disease, Peace, Farming, Education, Democracy, Finance, Migration.

3.4 Responsible management of risk and safety (TU Delft – 2nd quarter)

This course in the minor Responsible Innovation gives insight into how risk and safety can be managed responsibly, how responsible decision-making should take risk and safety into account, and how safety and risk relate to certain domains such as environmental management, sustainability, respect management, performance management, ethics, resilience, vulnerability, and the alike. How dealing with uncertainty as an integral part of decision making (e.g., using Bayesian methodologies) and risk governance, will be discussed. This will be approached from the level of a project team, a company, and of an entire economic system. Different safety domains will be addressed by several experts in the field. Assignments will be done to internalize the different concepts, methods and techniques and to gain more insight into all aspects regarding risk and safety. The Safety Management System will give structure to both the lectures and the assignments and will guide the student through the three system levels. Topics that will be discussed are: policy & regulations, Safety Culture, planning and implementing, risk measurement, performance review (and accident investigation), learning. Special attention will be dedicated to the academic skills of literature research and academic writing.

Learning objectives

After taking this course the student will have knowledge of:

- Recognising basic principles of the risk/uncertainty- and safety sciences in topical subjects;
- The different aspects of risk and safety that have to be taken into account when designing a system;
- Apply directives for collective and individual risks and risk standards (a.o. machine directive) and identify the problems associated with the development and application of these directives;
- Applying models that are present in the books 'Engineering Risk Management' and 'Risk, an introduction';
- Applying several risk analysis methods;

- Using safety science literature for writing an essay.

Assessment
Your grade for this course is based on your grade for the group assignment (20%) and an individual essay (80%). There is no test.

3.5 (Responsible) Innovation Management (Erasmus University Rotterdam – 2nd quarter)

Innovation management is usually defined as all the actions needed to turn good ideas for products, services or processes into commercial success. In this course about responsible innovation management we take a broader perspective: apart from the commercial success we also address success in terms of other aspects and a multitude of stakeholders - this makes the innovation responsible. Innovation management includes creativity, idea generation, selection and elaboration of ideas and the development of products, services or processes. Also next steps including production, distribution, marketing and sales get attention. We address how innovation projects can be managed within companies and in co-operation with external stakeholders. The innovation process combines creativity and arts, marketing and technology, psychology to understand customers, organisational design to create a proper innovative organisation, law in relation to patents and to government regulation, and many more fields of expertise. All these different perspectives must be combined to select the few good ideas out of hundreds of good ideas and to turn those good ideas into applications that are successful both from a commercial and a societal perspective.

Learning objectives
This course aims to provide you with basic knowledge about innovation management with an emphasis on how to respond to the interests of external stakeholders so as to render responsible innovation. At the end of the course you are able to:

- Recognise and use the terminology and main concepts from the discipline of innovation management;
- Carry out a strategic analysis of the market dynamics and consequently formulate the innovation strategy of a particular company and its implications;
- Give a description of the organisational structure of a company with regard to innovation and relate the type of innovation needed with the why to manage it;
- Explain how a selected innovation strategy relates to the firm's organisational structure, to the allocation of people and resources to projects, and to the execution of specific projects.

Assessment

- Small assignments (80%)
- Class participation (20%)

3.6 Ethics, culture and biotechnology (Leiden University – 2nd quarter)

Contemporary biotechnological practices (such as genetic modification) that involve manipulation of living beings present a challenge to traditional notions of nature and the human body. This is particularly true of synthetic biology, a form of bioengineering which includes both the design and construction of new biological parts, devices, and systems and the re-designing of existing natural biological systems. These developments pose pressing and urgent questions. Firstly, who has the right to re-design life? This is ultimately a question of legal and moral ownership and of the commodification of life and nature. Secondly, do we, as a society, think it is necessary to re-design life, and if so, how do we want to re-design nature and the human body? What limits do we wish to impose on biotechnological innovation involving nature and the human body? And what notion of 'being human' or human dignity and of nature are these limits based on?

The opportunities and possibilities of biotechnology challenge us to seek new approaches to the ethical, cultural, juridical and economic issues relating to biotechnological practices. The starting point of this course is that biotechnology is testing accepted ethical and aesthetic values concerning the human body and nature to such an extent that we need multiple perspectives in our search for a theoretical and practical position on new biotechnological challenges and developments. In particular, we will consider the contribution of art in this debate. We will discuss how artworks that engage with biotechnological practices enable the artist and the beholder to actively experiment with new ways of being, behaving and constituting subjectivities in relation to biotechnological developments.

Learning objectives

- Describe key ethical issues in biotechnology and its products;
- Describe key historical and cultural issues in biotechnology and its products;
- Identify individual and social barriers that play a role in the application of biotechnological innovations;
- Identify various perspectives and values in the public debate surrounding biotechnology;
- Reflect upon the role of the industry and the entrepreneur in addressing ethical issues regarding a biotechnological product;
- Develop debating skills and critical reading skills.

Assessment

During our course, we will be contacting 3 debate sessions on contemporary bioethical issues. All students will be assigned in groups, you will stay in the same group throughout the course. However, we will be rotating debate panels and jury panels across sessions.

4. Contacts

For general questions regarding the minor you can contact Dr. P.J. (Phil) Robichaud (p.j.robichaud@tudelft.nl).

For questions regarding the Thematic Modules, you can contact the module managers:

Thematic Module	Contact	Email
Responsible Innovation. Introduction	Dr. C.I.M. (Caroline) Nevejan	C.I.M.Nevejan@tudelft.nl
Innovation and Interface Management	Dr. Ir. H.J. (Henk) de Vries P.M. (Paul) Wiegmann, MSc	hvries@rsm.nlhvries@rsm.nl wiegmann@rsm.nl
Global Citizenship	Dr. U. (Ulrich) Mans	u.mans@cdh.leidenuniv.nl
Responsible management of Risk and Safety	Dr. S. (Simone) Sillem	S.Sillem@tudelft.nl
(Responsible) Innovation Management	Dr. A.S. (Annelies) Bobelyn	bobelyn@rsm.nl
Ethics, Culture and Biotechnology	Dr. Ing. R. (Rob) Zwijnenberg Dr. A. (Amalia) Kallergi	r.zwijnenberg@hum.leidenuniv.nl a.kallergi@hum.leidenuniv.nl

Appendix A: Assessment form Student Project Groups – Report

Title paper: _____

		Score
	Criterion	**Weak = 1 Average = 2 Good = 3**
1.	The intervention cycle is being applied in a weak/average/good way.	
2.	The way the topic is being addressed is original (no/to some extent/yes!).	
3.	The way the topic is being addressed can be used as example for other groups (no/to some extent/yes!).	
4.	The contribitions from different academic disciplines are being used and integrated in a balanced way (weak/average/good).	
5.	The paper's topic is treated at a weak/average/good level.	
6.	The paper's conclusions match weakly/average/good with the problem formulation and follow logically from the arguments.	
7.	The paper uses literature and course materials weakly/average/good.	
8.	The paper is expected to be relevant for practitioners (no/to some extent/yes!).	
9.	The paper's structure, length (could it be shorter?), and the division of content over the paper's sections are weak/average/good.	
10.	The paper's layout, language (including source citing and referencing, and typing errors), style and overall impressions are weak/average/good.	
	Total score	

Grade: _____

Comment:

Score	Mark	Score	Mark
11	2.7	21	6
12	3	22	6.3
13	3.4	23	6.7
14	3.7	24	7
15	4	25	7.4
16	4.3	26	7.7
17	4.7	27	8
18	5	28	8.5
19	5.3	29	9
20	5.7	30	10

Elucidation

The maximum score is 30 points. Coaches can deviate from this score based on general impression. Especially in the case you really add to the common understanding of responsible innovation you can get a higher grade.

Appendix B: Assessment form Student Project Groups - presentations

Group:_____
Coach:_____

	Poor	Fair	Good	Very good	Excellent
The introduction was effective and informative.	☐	☐	☐	☐	☐
The group showed ability to carry our multidiscinary research in a balanced way.	☐	☐	☐	☐	☐
The findinsg are expected to be relevant and helpful for the target stakeholder.	☐	☐	☐	☐	☐
The visual aids, e.g., slides, overheads, etc., were clear, effective and well used.	☐	☐	☐	☐	☐
The speaker's demeanor, volume, and manner of speaking were effective and clear.	☐	☐	☐	☐	☐
The ending drew things together well.	☐	☐	☐	☐	☐
The technical content was good, including clear and justifiable assumptions, methodology, relevant conclusions, etc.	☐	☐	☐	☐	☐
The questions were handled well	☐	☐	☐	☐	☐

Comment:

Grade: _____