Survey of master level educational programs in the knowledge domain of risk

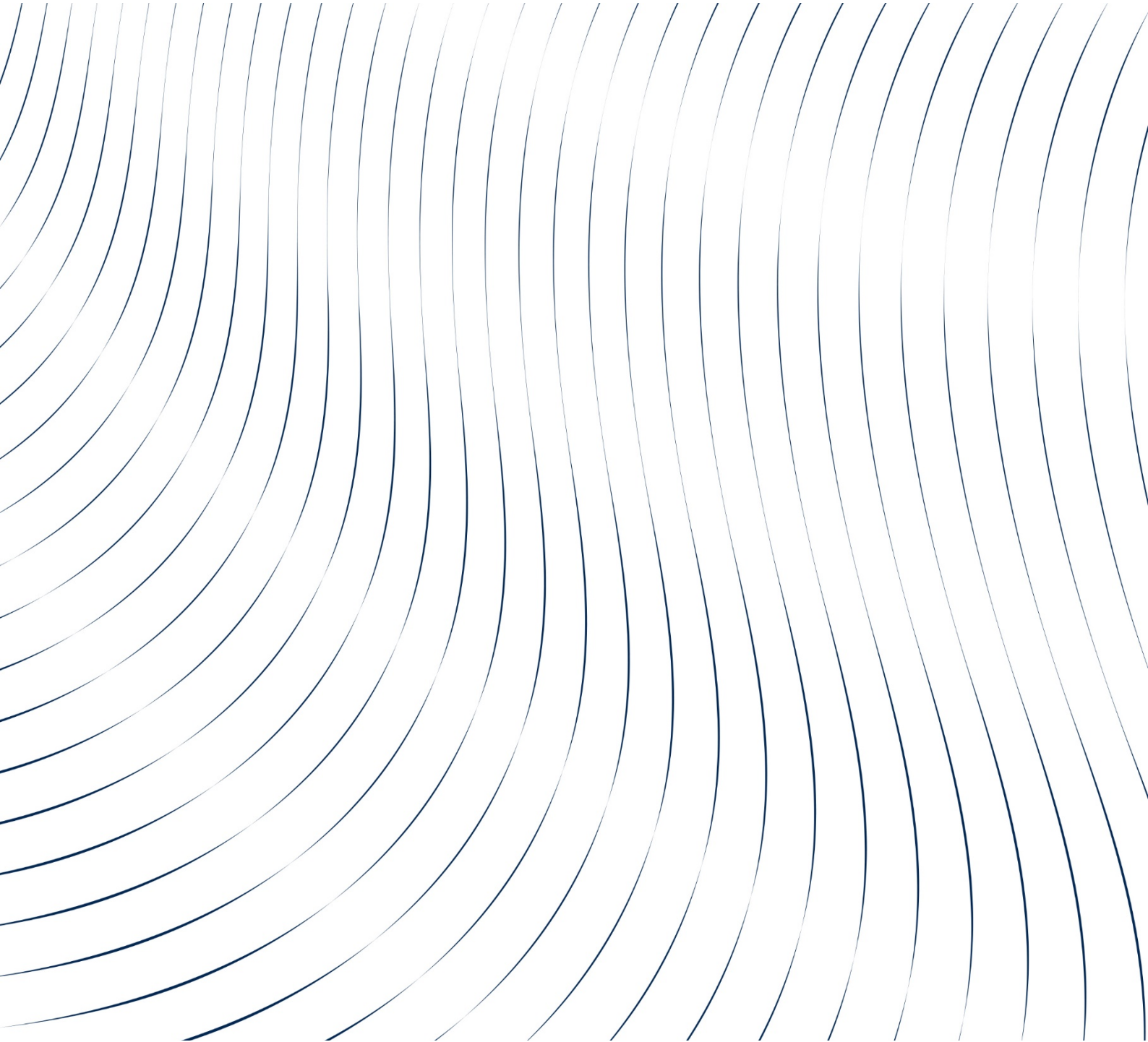
Nielsen, Linda

Publication date:
2020

Document Version
Publisher's PDF, also known as Version of record

BUILD Report 2020:23

Survey of master level educational programs in the knowledge domain of risk



SURVEY OF MASTER LEVEL EDUCATIONAL PROGRAMS IN THE KNOWLEDGE DOMAIN OF RISK

Linda Nielsen

BUILD Report 2020:23
Department of the Built Environment, Aalborg University
2020

TITLE	Survey of master level educational programs in the knowledge domain of risk
SERIAL TITLE	BUILD Report 2020:23
FORMAT	Print
EDITION	1.
YEAR	2020
DIGITAL PUBLICATION DATE	September 2020
AUTHOR	Linda Nielsen
LANGUAGE	English
PAGES	14
ISBN	978-87-563-1964-5
PUBLISHER	Department of the Built Environment, Aalborg University A.C. Meyers Vænge 15, 2450 Copenhagen SV E-mail build@build.aau.dk www.build.auu.dk

Foreword

This report summarizes the results obtained from a desktop (world wide web) survey of master level programs in the context of risk assessment and/or management. The aim of the survey is to map the number and type of tertiary level programs currently available at European universities.

Over 100 programs are identified that have been initiated between 2008 and 2016. In the present report, these programs are classified according to criteria such as geographic location, faculty affiliation, types of hazards, curricula patterns, didactic approaches, and education management. The results provide a baseline understanding of the present state of tertiary level education in the area of risk.

Table of contents

1. Introduction

This report provides a summary of information obtained from a desktop survey carried out between November 2016 and January 2017, of risk related master level programs offered in the EU/UK and EEA countries.

The objective of establishing this overview is to provide preliminary basis for assessing current trends and directions in educational offers in the domain of risk and to identify potentials and possible gaps that may be essential for the design of new educational offers within the same domain.

The report is organized into three main sections addressing:

- Mapping and characteristics of educational offers
- Contents, organization and curricula
- Teaching methodology and modes of assessment

2. Mapping and characteristics of educational offers

Countries offering educational programs in the domain of risk

As the present study is targeted for programs taught in English, unsurprisingly as evident from Figure 1, the UK offers the largest number of programs spread over the whole spectrum of risk from assessment to management, from highly specialized single hazard programs to programs with the broadest possible content. The number of UK programs included in Figure 1 is not exhaustive. Following what appears to be a fashion trend for the subject of risk, there are multiple education offers at practically every UK higher education institution from world class ranking universities to polytechnics and community colleges.

For all the other European countries, the number of programs recorded (Figure 1) is more representative of reality since the programs offered in English, where English is not the official language, are much fewer. Arguably, there could be a connection between this and the “trendiness” factor mentioned above, where there are many more traditional programs that deal with the subject of risk implicitly rather than explicitly, and which are still taught in the native language of the respective countries (e.g. Reliability & Safety Engineering, Environmental Engineering, Chemistry, Agro-Forestry, etc.). The underlying conclusion is that risk is trendy and international, which explains the proliferation of risk programs over the past 5 years.

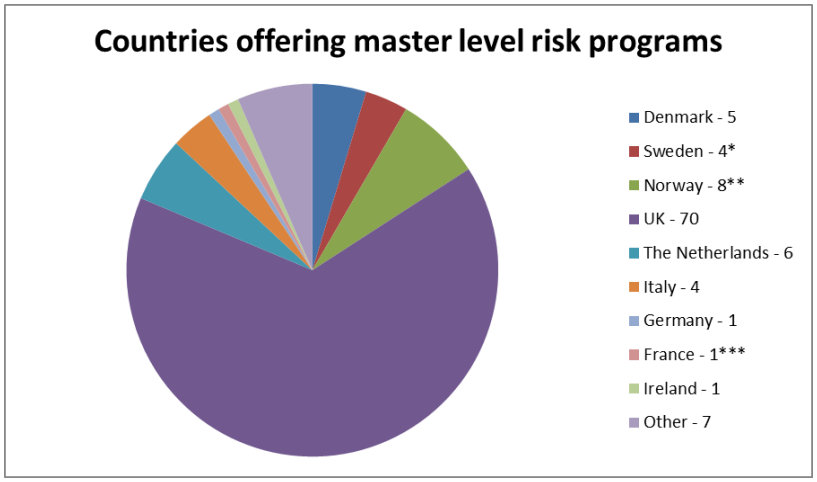


Figure 1 Countries offering master level programs in the domain of risk.*3 programs in English; 1 in Swedish, **4 programs in English; 4 in Norwegian, ***only in French. The category 'Other' refers to joint EU Erasmus programs.

Academic titles of programs

The overwhelming majority of programs are MSc programs. There can be no doubt that risk is perceived as well as being sold as a science, with a capital 'S' even though the majority of programs have precious little scientific content. However, a clearer distinction might be identified by looking at the risk areas the programs are targeting, i.e. risk assessment or risk management, see Figure 2. Here the typical academic and practitioner's bias is evident: risk assessment is quantitative, scientific and rigorous; risk management is qualitative, subjective and not rigorous.

Traditionally, theory of risk has been studied and researched in the context of the following academic disciplines: Philosophy, Anthropology, Sociology and Psychology. While most of the surveyed programs offer some kind of introductory course on risk where risk theories and perspectives are outlined, theory of risk as a study/research topic is almost entirely absent. This is also clearly reflected in the absence of MA programs on offer, where even programs with little to no scientific content are labeled MSc, thus underlying the perceived importance and superiority of a MSc degree vs. a MA degree. This trend is further exemplified by the significant difference in tuition fees (where applicable), whereby a MA degree is often much lower in tuition.

In the corpus of all programs included in the present search, only two programs were found focusing on the theory of risk: MSc Sociology of Risk, London School of Economics – Department of Sociology and to a smaller extent MA/MSc Environmental Anthropology, University of Kent – School of Anthropology and Conservation.

Finally, it should be noted that post graduate diplomas and certificates are only offered in the UK. Typically, they are associated with programs with more flexible type of studies, including part time, distance learning, individual module options, etc. that are geared towards: a) a more mature professional audience or b) a way into higher education for students with lesser than the required qualifications.

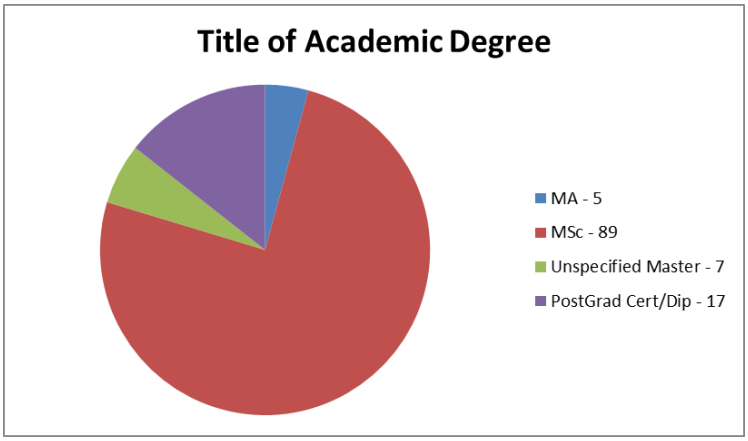


Figure 2 Distribution of the titles of academic degrees offered in risk programs.

Distribution of host departments/faculties offering risk programs

The numbers in this category reflect to a large extent the distribution of educational programs in the domain of risk according to the area of risk they focus on (see Figure 3 and Figure 5). As may be observed Natural Sciences and Applied Engineering Sciences have more or less equal weight compared to the Social Sciences, while Mathematics and Computer Sciences have fewer offerings.

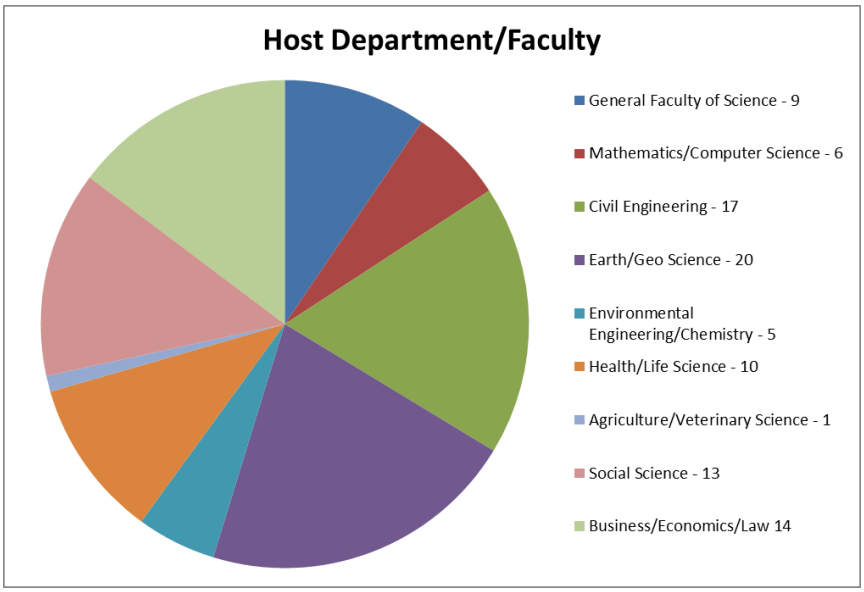


Figure 3 Distribution of host departments and faculties offering risk educations.

Risk areas covered by educational offers

Risk Area refers to the different functions or activities during a risk analysis process. As there is no agreed definition on what constitutes these terms, for the purposes of clarification, this document refers to the following conceptual framework: Risk Analysis is the all-encompassing process; it includes Risk Assessment and Risk Management.

From the performed survey, three risk areas have been identified: (i) programs focusing on risk assessment (largely quantitative hazard/risk modelling); (ii) programs focusing on risk management (qualitatively addressing societal/environmental impacts); and (iii) risk management (quantitatively addressing operational research/financial modelling).

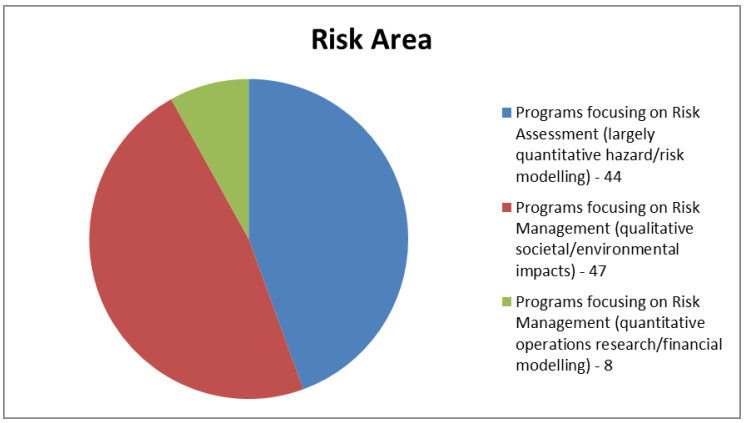


Figure 4 Distribution of risk areas covered in educational offers in the domain of risk.

Risk types addressed in educational offers

Risk type refers to either the specific hazard(s)/threat(s) or the industry typically exposed to it. The distribution of risk types in the identified educational offers in the domain of risk is shown in Figure 5.

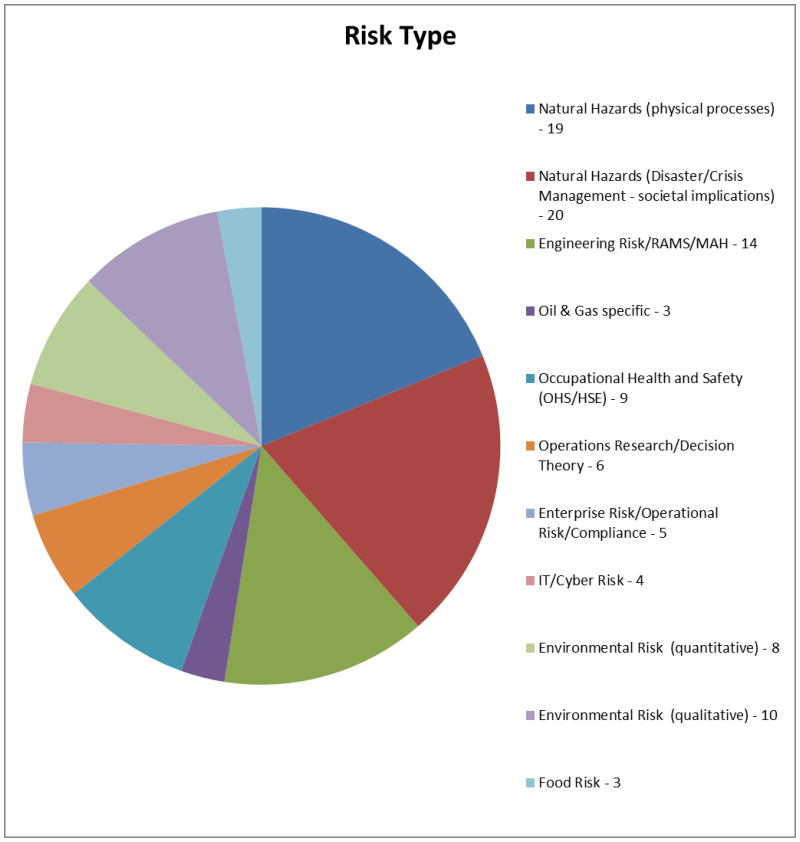


Figure 5 Distribution of risk types across the identified educational offers in the domain of risk.

Number of years since programs have been operational

Very few websites have information on when a program was established. At the same time many state that this is a "new" program. It appears that the majority of programs have been running for less than 5 years. An exception to that are traditional MSc programs rooted in civil/geotechnical/environmental engineering, which clearly have a long history of operation.

Number of students enrolled in educational offers in the domain of risk

Very few websites mention the number of students enrolled in and having completed their educational offers in the domain of risk. Of those that do the typical number is 12-15 per intake. Several programs mention a limit of 30 students.

Duration of offered educational offers

Programs duration is between 1-2 years full time, 2-4 years part time, and in the case of e-learning or individual modules open to professionals, the time can vary from a semester up to 7 years.

Almost all programs in the UK are organized on a 1 year full time/2 years part time basis. Almost all non-UK programs are 2 years full time.

The majority of programs hosted by engineering (civil/geotechnics/environment) departments are 2 years f/t. Programs specific to the extraction and processing industries, typically offer either an industrial internship or support from an industrial partner for a student project. These typically take one whole semester. An exception are programs focusing on OHS/HSE, which are typically 1 year f/t. However, those are rarely situated in engineering, rather business faculties, or occasionally, health.

The majority of programs on disaster risk are 1 year f/t. Many of them include a field trip (typically 1-2 weeks in between semesters) or a promise of some NGO or international organization internship.

Tuition fees for educational offers in the domain of risk

Home (or native) students and EU students usually pay no tuition fee in EU countries and Norway. For non-EU overseas students the cost varies between EUR 10,000 – 20,000 per year.

In the UK, the average yearly tuition for UK/EU students is +/- £ 10,000; for overseas students - £ 20,000.

In many cases non-EU students are only allowed to pursue full time studies. In Norway, while tuition is free for all students regardless of origin, non-EU students must provide legal proof of being able to support themselves in Norway, amounting to a minimum of ca. NKK 100,000.

Distance/e-learning programs tend to be the same price for all students (with a few exceptions) and the tuition fees are much lower.

In the case where professionals are allowed to take individual modules, there are particular prices p/module. The price is relative to the number of ECTS credits.

Admission requirements to enter education offers

It is difficult to estimate how competitive the admission to a program is since most institutions describe themselves as competitive and follow a more or less standard admission's criteria of an above average GPA from a bachelor degree and a completely standard English test requirements. Almost all institutions state that they will consider candidates with other qualifications or experience on an individual basis, which suggests that admission is not highly competitive.

Those programs embedded in more traditional engineering departments, require an engineering bachelor degree. This includes all the hands on programs organized around extraction and process industry risks as well as some programs dealing with the transport sector.

Programs that focus on disaster risk or where risk management instead of risk assessment is typically taught, admit just about everyone: natural sciences, social sciences, health and life sciences, and business. No one seems to be keen on the humanities, however, it is uncertain to what extent a distinction is made between social sciences and humanities!

A handful of programs require university level calculus or advanced calculus with above average GPA as a prerequisite. None of the programs have a prerequisite for non-social science students, i.e. for engineers, in basic theory of science.

The standard English requirements are: IELTS 6.5; TOEFL (paper) 560, (digital) 88; Cambridge CAE, CPE.

Program description, objectives and target audience

The description of the programs identified typically specify the aims of the programs, the target group, specific risk specialization (or emphasis on multidisciplinary, all-inclusive approach) and typical skills the student will possess at the end of program.

3. Content organization and curriculum

Based on the conducted survey the typical organization of a full time 2 year program may be outlined as:

- Semester 1 – Introductory and theoretical basis courses obligatory for all students (typically 4 modules per semester).
- Semester 2 – Methodological courses and some electives.
- Semester 3 – Advanced methodological courses and some electives. In many cases, also a group project.
- Semester 4 – Master thesis.

Following the division of programs into three main streams according to Risk Area, further more specialized clusters and sub-clusters may be identified. The choice to organize specializations into clusters rather than hierarchies is to be able to represent how all specializations might potentially be related in one holistic framework.

The cluster Quantitative Hazard/Risk Assessment encompasses programs with mostly technical and quantitative aspects of risk assessment and can be broken down into four sub-specializations: includes four sub-specializations (Figure 6). The first two stem traditionally from the Applied Engineering Sciences and the Natural Sciences - Natural Hazards and RAMS/MAH. RAMS stands for Reliability, Availability, Maintainability and Safety. MAH stands for Major Accident Hazards (e.g. oil spills, fire, explosion, etc.). Two further specializations fall in the domains of Chemistry and Environmental Engineering, focusing on Toxicology and Environmental Risk Assessment.

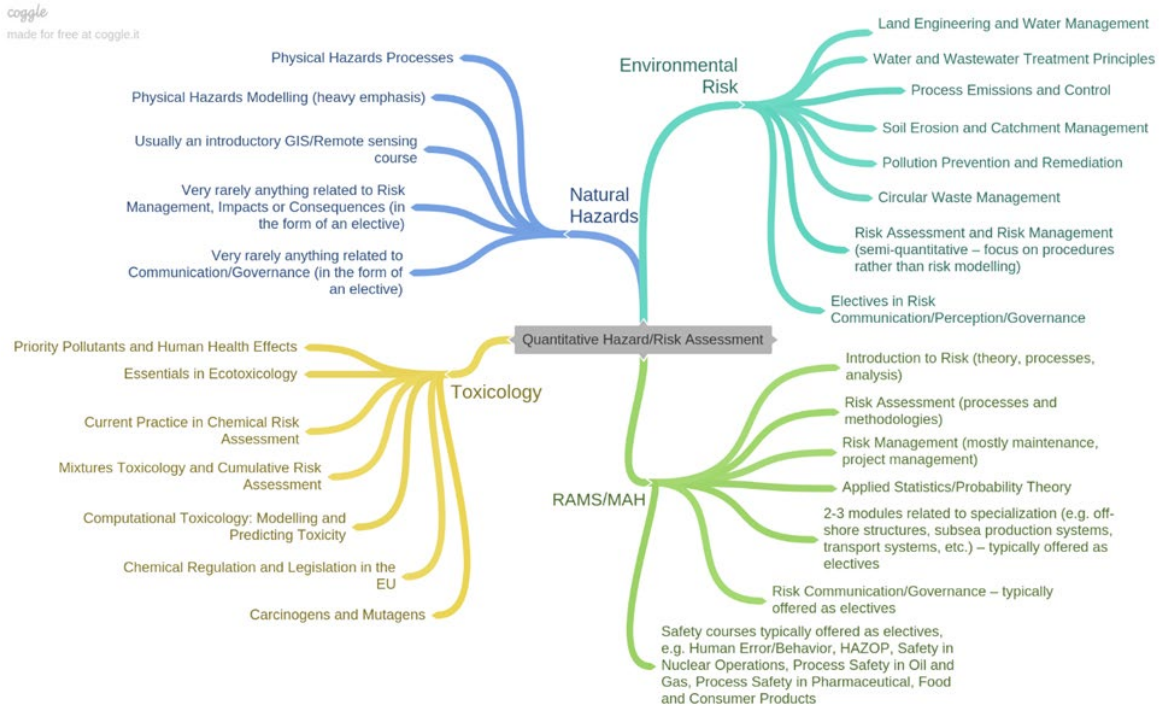


Fig. 6 Specialization cluster for educational offers on quantitative hazard/risk assessment.

The Natural Hazards specialization largely concerns geotechnical and hydrological hazards. The main focus of such programs is on the physical processes and the physical exposure modelling of the hazards and much less so on risk assessment. Most programs include a crash GIS course. Consequence modelling, including any economic models for optimization and decision support are almost entirely absent in the curricula. Occasionally, a few courses are offered in the form of electives related to risk management or risk/science communication, or governance.

The RAMS/MAH specialization focuses on risks in the extraction, process and transport industries. Some curricula are more focused on reliability aspects of risk (mostly those in a civil engineering context); others are predominantly concerned with safety issues (those with a MAH or Transport background). The former have a strong emphasis on quantitative risk assessment based on applied statistics and probability; the latter are almost entirely concerned with methods and tools in safety practice. Many of the safety programs (especially in the UK) are hosted by Business faculties and typically include a lot of organizational management, psychology and ergonomics.

Surprisingly, almost none of the courses in the RAMS/MAH category have a module on Consequence Modelling. Similarly, principles of decision theory and optimization are almost entirely lacking. No programs even remotely approach the topic of sustainability (in the context of quantitative sustainability assessment). Only NNTU offers an elective module on Life Cycle Assessment.

Programs that apply largely qualitative methods focus typically on processes and procedures in the Risk Management domain, while mostly using descriptive methods to refer to risk assessment conclusions. These programs fall roughly under the theme cluster Qualitative Risk Management, which further branches into Disaster/Crisis Management, with the following sub-specializations: Disaster/Crisis Management, Global Health, Security Risk, and Food Security; Human and Environmental Health with sub-specializations in Environmental Management and Food Safety; and Corporate Risk with sub-specializations in Law and Compliance, Operational Risk Management, and IT/Cyber Security Risk (see figures 7- 0).

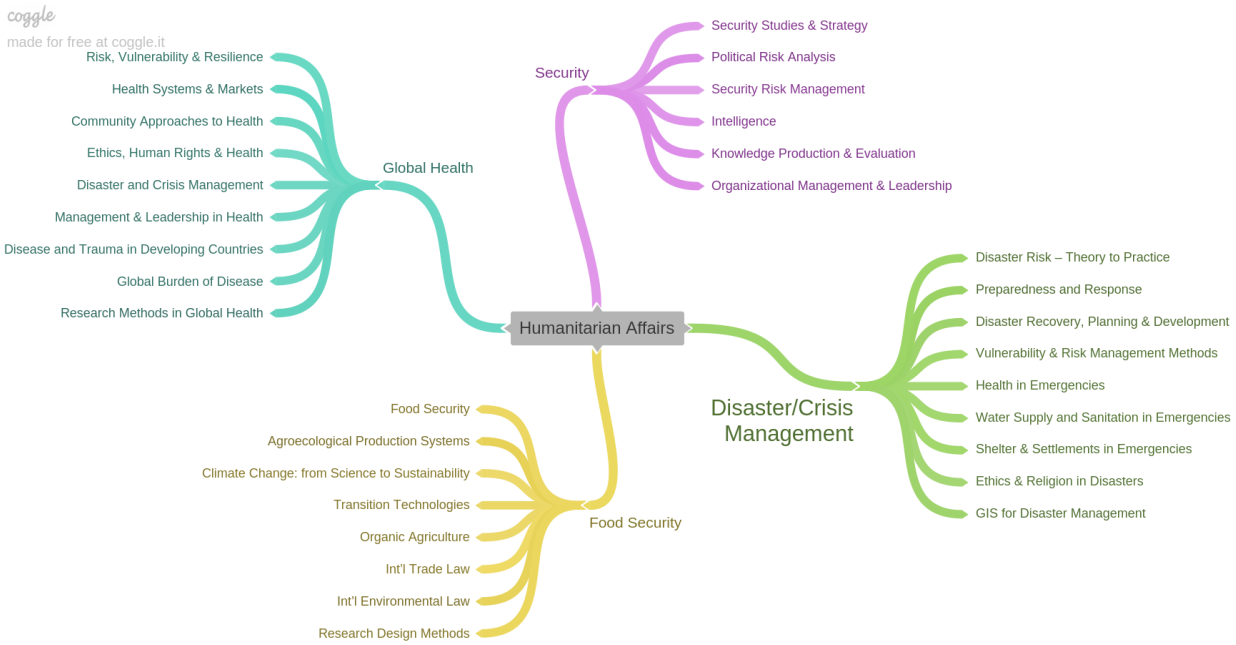


Figure 7 Specialization cluster Disaster/Crisis Management.

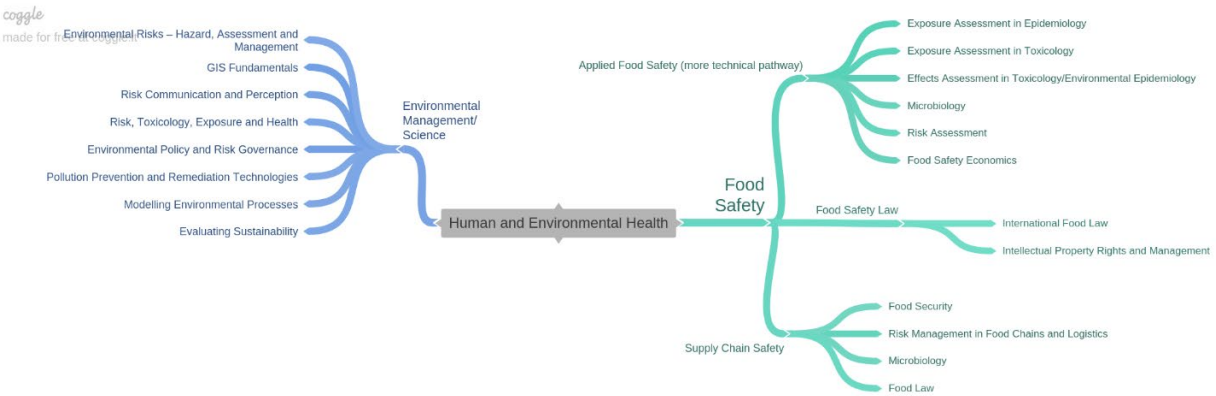


Figure 8 Specialization cluster Human and Environmental Health.

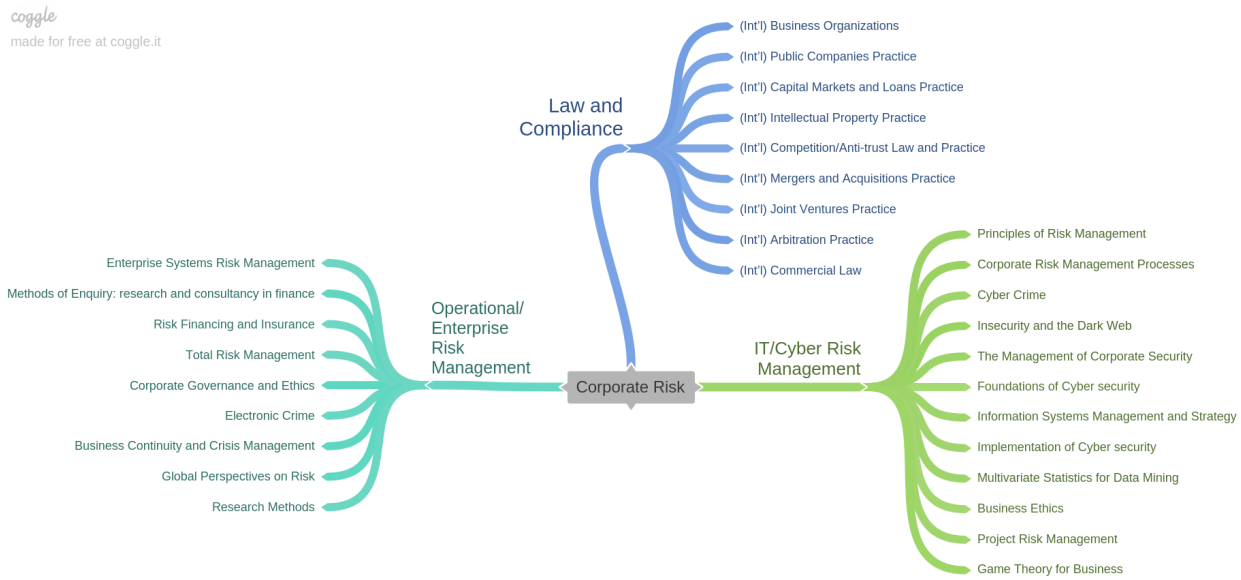


Figure 9 Specialization Cluster Corporate Risk.

Finally, the specialization cluster Quantitative Risk Management includes programs related to Risk Management from the perspective of mathematical modeling – Statistics and Probability theory, Decision Analysis and Operations Research, see Figure 10.

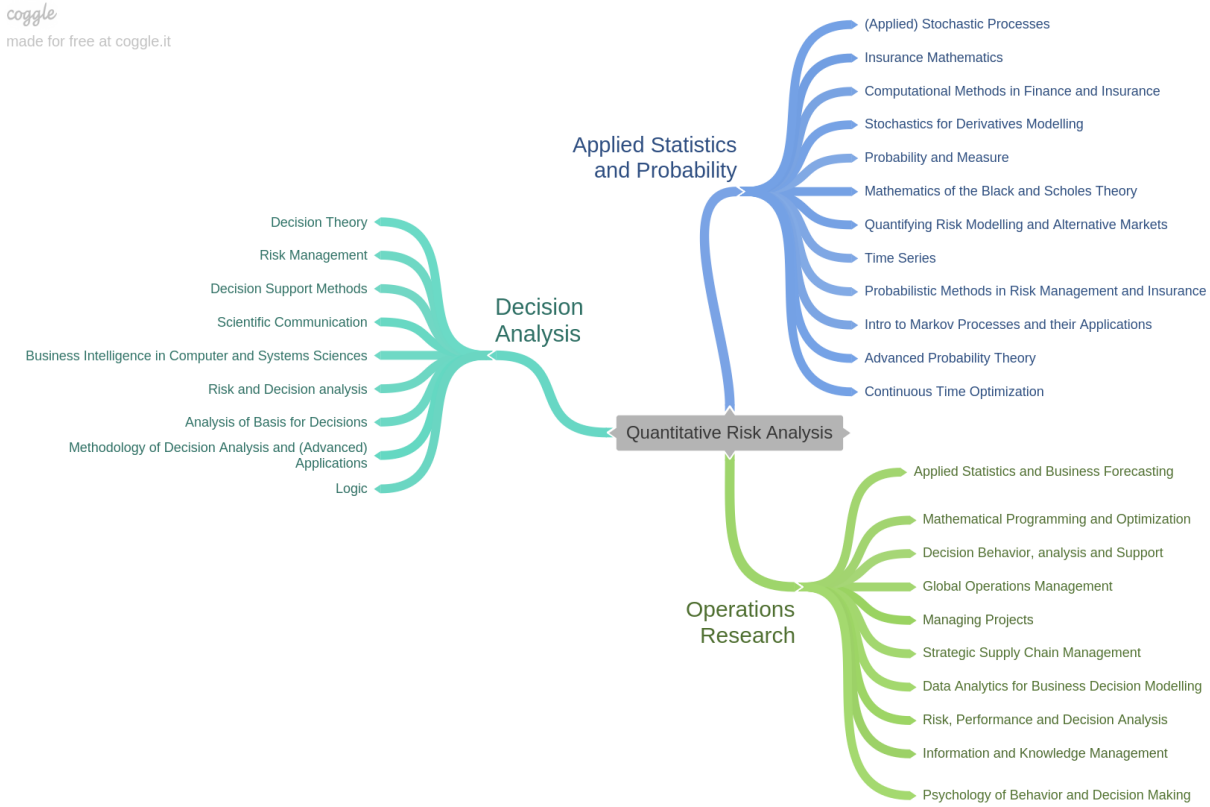


Figure 10 Specialization Cluster Quantitative Risk Management.

4. Teaching methodology and modes of assessment

While few programs explicitly mention Problem/Project Based Learning methods, many in fact seem to include project based assignments. In almost all programs some combination of traditional lectures, individual research and project group work is described. Many programs promise the students direct access to industry or government/international organizations in the form of internships, or project/thesis work supported by partner institutions or companies. Most programs in the natural hazards domain (both quantitative and qualitative) offer field trips to hazard areas or areas struck by disasters as a complementary practical experience (cost for such trips is additional to the tuition).

Assessment is typically in the form of written assignments, oral presentations of individual and project work and a final master thesis. Formal examinations seem rare. In a small number of programs, assessment for individual modules is carried out by academic staff external to the program.

DEPARTMENT OF THE BUILT ENVIRONMENT
AALBORG UNIVERSITY