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# Knowledge FOr Resilient soCiEty

## EU/UK/EAA Survey

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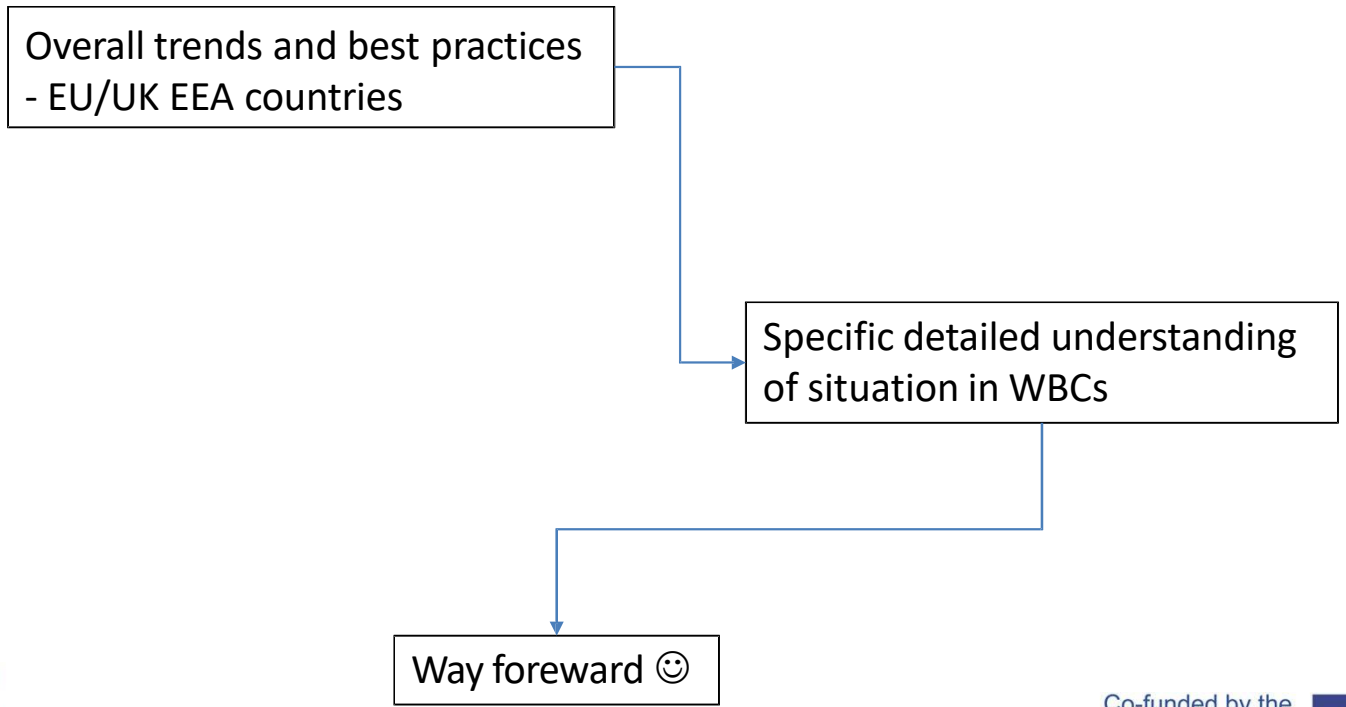
# Background

## Approach tosurvey

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# Background

## Approach tosurvey


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# Background

## The survey covers the EU, the UK and EEA countries and addresses:

| | |
|---|---|
| (i) | Country offering the program |
| (ii) | Academic Title of program |
| (iii) | Host Department/Faculty, offering the program |
| (iv) | Risk Area and Risk Type |
| (v) | Number of years Since the program has been operational |
| (vi) | Number of students enrolled |
| (vii) | Duration of program in months/years as well as study options such as full and part time, distance learning, etc. |
| (viii) | Tuition Fee |
| (ix) | Admission requirements |
| (x) | Program Description, including objectives and target audience |
| (xi) | Content, including organization and curriculum |
| (xii) | Teaching/Learning describing teaching methodology and assessment |
| (xiii) | Academic staff, and |
| (xiv) | Personal Observation – subjective impressions of the author |



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# Background

## Maturity/durations and tuition

Most educational programs are less than 5 years old – with the exception of civil engineering related educations which typically are substantially older

Typical durations are:
2 years (full time)
2-4 years (part time)
Up to 7 years (e-learning)

Typically civil engineering risk educations are 2 years of duration

Tuition fees are around 15-25 kEuro per year

E-learning offers are much less expensive



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# Background

## Admission

Admission requirements are typically given for students entering engineering programs – to make sure the students have sufficient knowledge and training in mathematics and physics

Such requirements are not given to student entering into social science programs

Disaster relief/management programs are very open to student flexibly independent on background ☺



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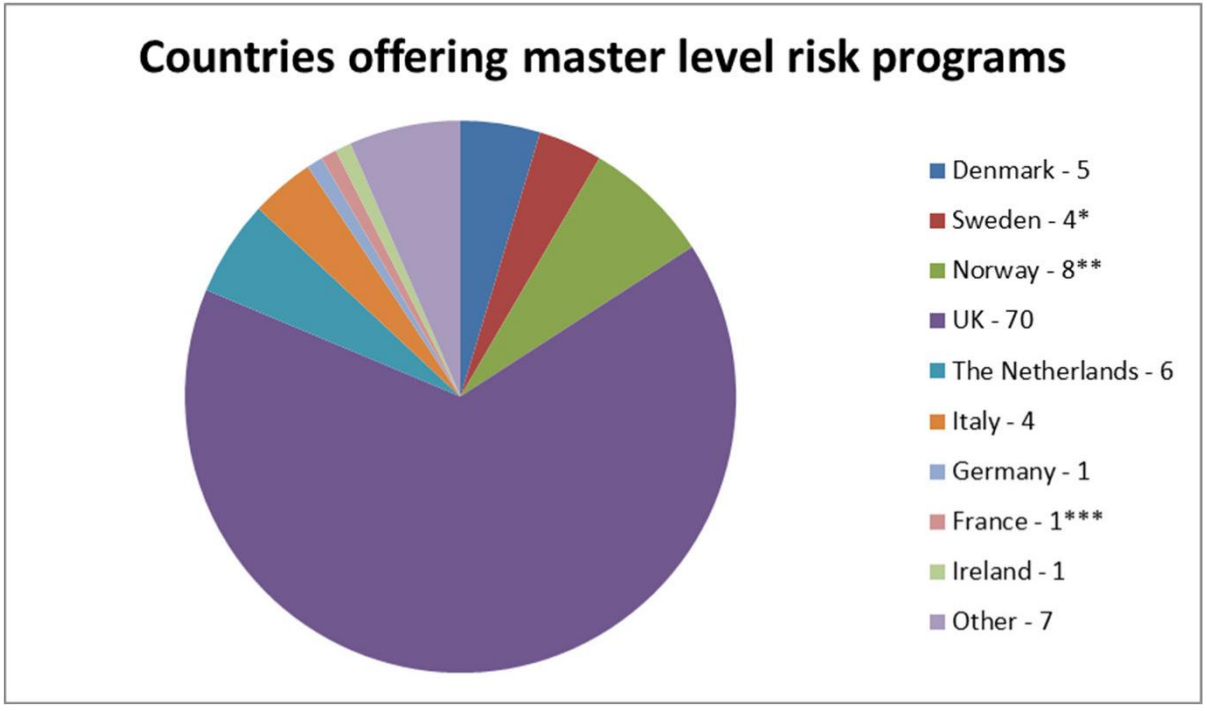
# Risk offers across the EU/UK EEA

## More than107 educational programs are offered

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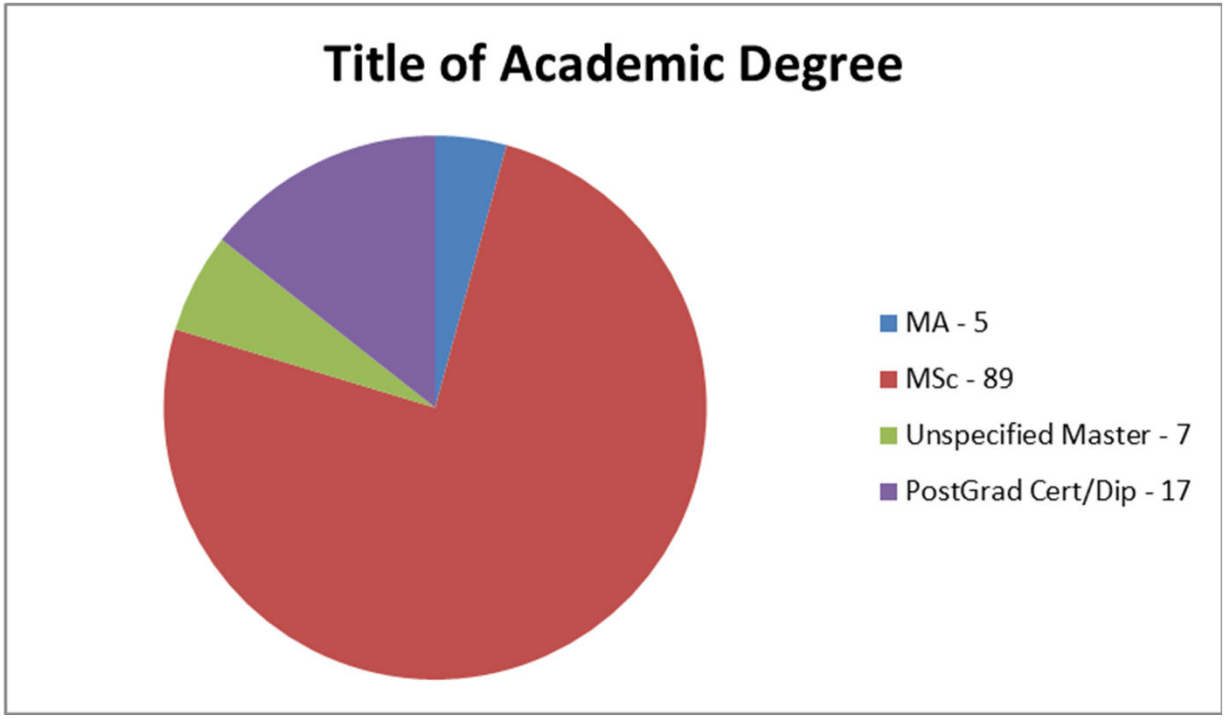
# Risk offers across the EU/UK EEA

## The vast majority of programs are MSc

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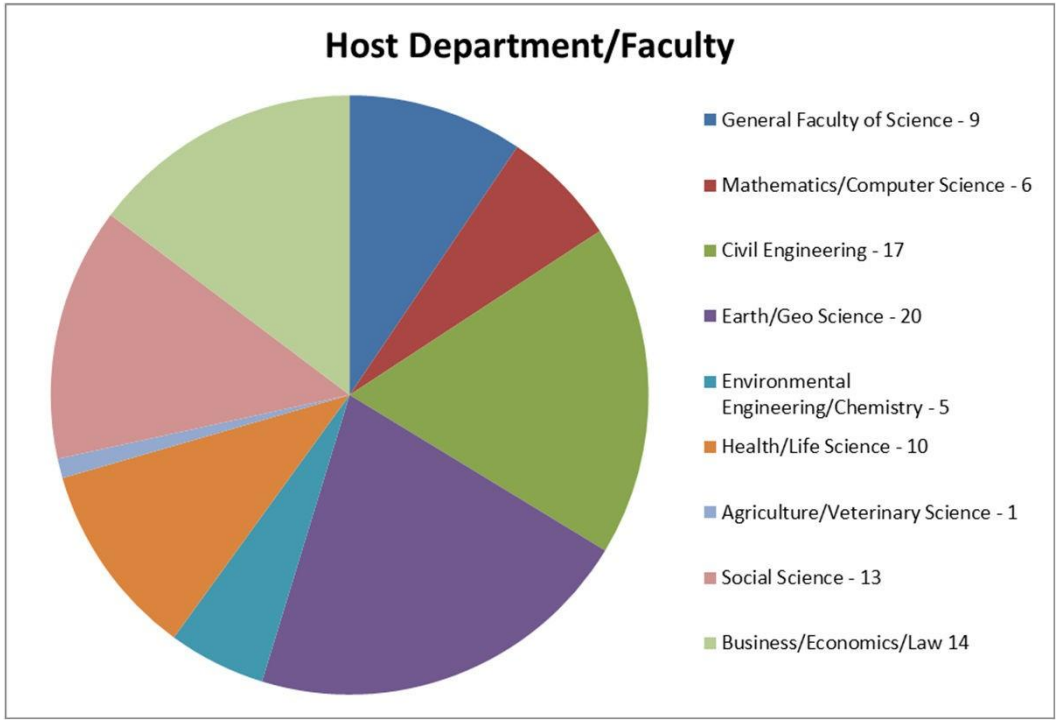
# Risk offers across the EU/UK EEA

Distribution over wide variety of sciences/application areas




Mostly qualitative in social sciences

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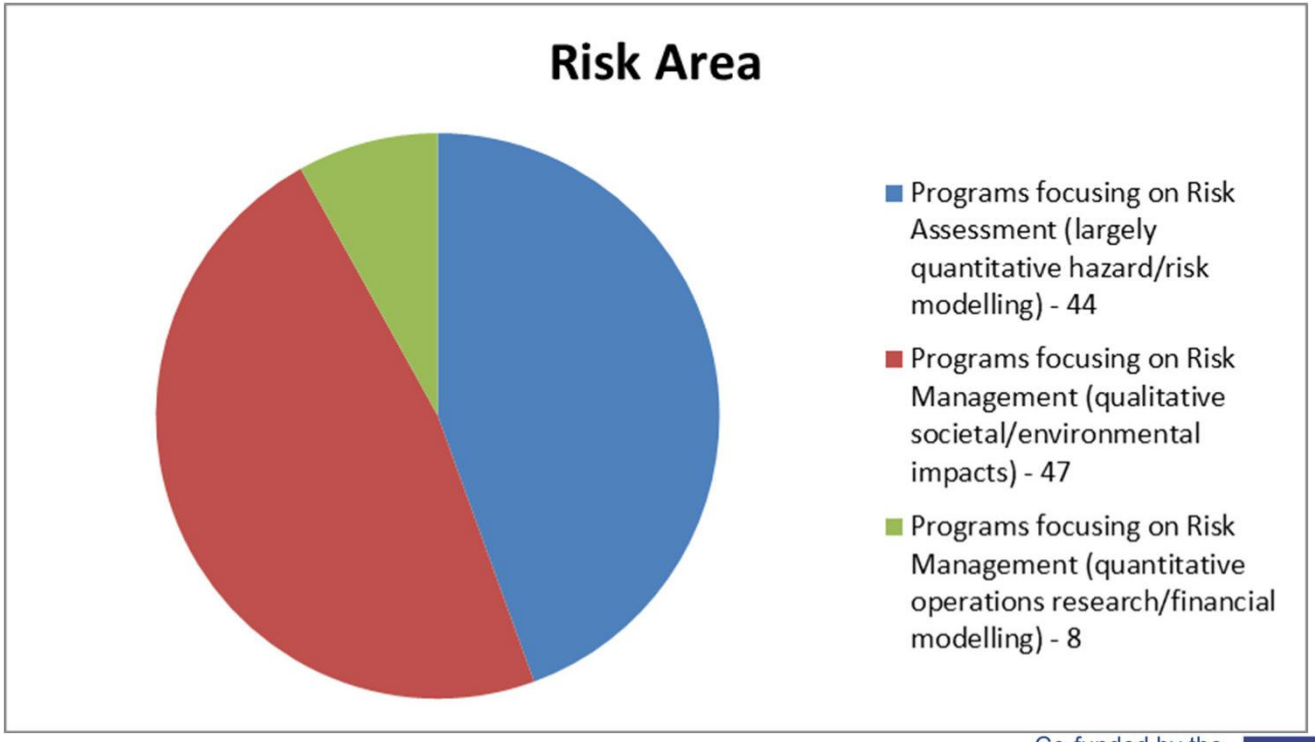
# Risk offers across the EU/UK EEA

Different foci/application areas are offered in the educations

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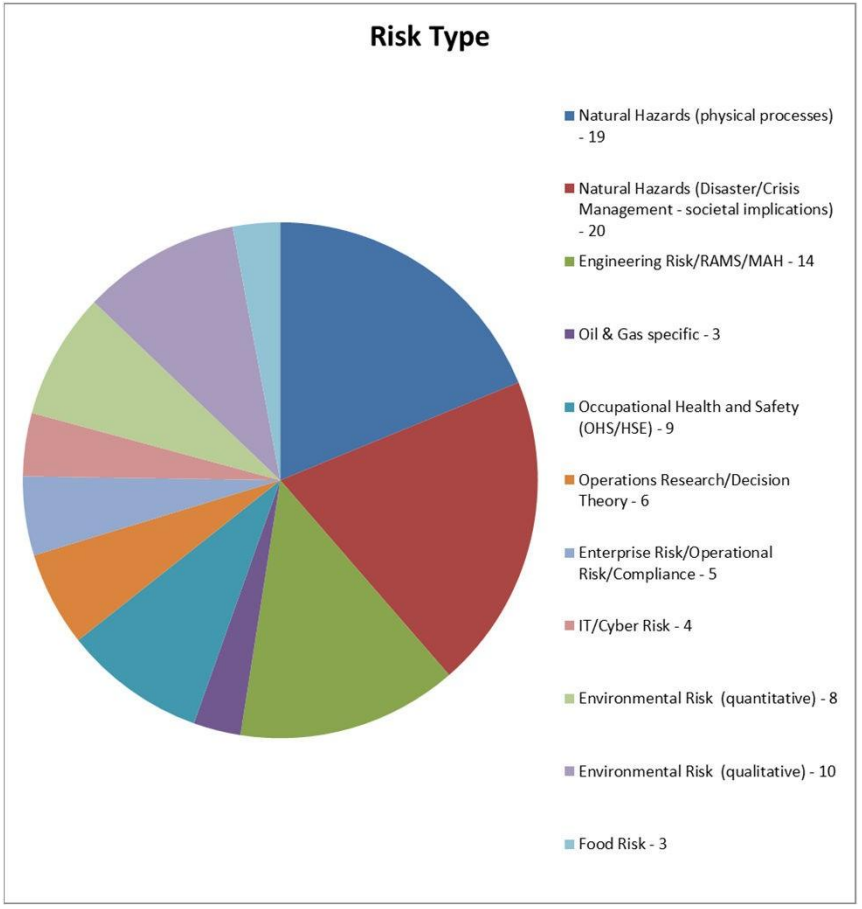
# Risk offers across the EU/UK EEA

Risk types are differentiated according to hazards/industries

Natural hazards is dominating
- hazard processes
- disaster/crisis management and relief

Engineering risks

Environmental risks

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# Typical contents of programs

## Descriptions

program's aims
target group
specific risk specialization

## Semester organization of taught material

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



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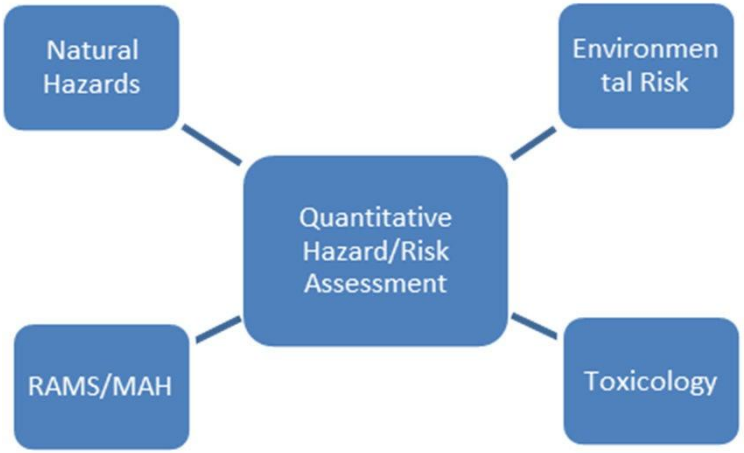
# Typical contents of programs

## Risk assessment (quantitative) programs

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# Typical contents of programs

## Typical curricula risk assessment natural hazards

| Specialization Natural Hazards | Specialization RAMS/MAH |
|---|---|
| Physical Hazards Processes | Introduction to Risk (theory, processes, analysis) |
| Physical Hazards Modelling (heavy emphasis) | Risk Assessment (processes and methodologies) |
| Risk Assessment/Risk Analysis (less emphasis) | Risk Management (mostly maintenance, project management) |
| Usually an introductory GIS/Remote sensing course | Applied Statistics/Probability Theory |
| Very rarely anything related to Risk Management, Impacts or Consequences (in the form of an elective) | 2-3 modules related to specialization (e.g. off-shore structures, subsea production systems, transport systems, etc.) – typically offered as electives |
| Very rarely anything related to Communication/Governance (in the form of an elective) | Risk Communication/Governance – typically offered as electives |
| | Safety courses typically offered as electives, e.g. Human Error/Behavior, HAZOP, Safety in Nuclear Operations, Process Safety in Oil and Gas, Process Safety in Pharmaceutical, Food and Consumer Products |



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# Typical contents of programs

## Typical curricula risk assessment environment/toxicology

| Specialization Environmental Risk (quantitative) | Specialization Toxicology |
|---|---|
| Land Engineering and Water Management | Priority Pollutants and Human Health Effects |
| Water and Wastewater Treatment Principles | Essentials in Ecotoxicology |
| Process Emissions and Control | Current Practice in Chemical Risk Assessment |
| Soil Erosion and Catchment Management | Mixtures Toxicology and Cumulative Risk Assessment |
| Pollution Prevention and Remediation | Computational Toxicology: Modelling and Predicting Toxicity |
| Circular Waste Management | Chemical Regulation and Legislation in the EU |
| Risk Assessment and Risk Management (semi-quantitative – focus on procedures rather than risk modelling) | Carcinogens and Mutagens |
| Electives in Risk Communication/Perception/Governance | |

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# Typical contents of programs

## Risk management (qualitative/quantitative) programs


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# Typical contents of programs

## Typical curricula Disaster/Crisis Management, Security Risk, Global Health, andFood Security

| Disaster/Crisis Management | Security Risk | Global Health | Food Security |
|---|---|---|---|
| Disaster Risk – Theory to Practice | Security Studies & Strategy | Risk, Vulnerability & Resilience | Food Security |
| Preparedness and Response | Political Risk Analysis | Health Systems & Markets | Agroecological Production Systems |
| Disaster Recovery, Planning & Development | Security Risk Management | Community Approaches to Health | Climate Change: from Science to Sustainability |
| Vulnerability & Risk Management Methods | Intelligence | Ethics, Human Rights & Health | Transition Technologies |
| Health in Emergencies | Knowledge Production & Evaluation | Disaster and Crisis Management | Organic Agriculture |
| Water Supply and Sanitation in Emergencies | Organizational Management & Leadership | Management & Leadership in Health | Int'l Trade Law |



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# Typical contents of programs

## Cluster human health/environment/food


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# Typical contents of programs

## Typical curricula for specializations Environmental Management and Food Safety

| Environmental Management | Food Safety |
|---|---|
| Environmental Risks – Hazard, Assessment and Management | Applied Food Safety (more technical pathway)<br>• Exposure Assessment in Epidemiology<br>• Exposure Assessment in Toxicology<br>• Effects Assessment in Toxicology/Environmental Epidemiology<br>• Microbiology<br>• Risk Assessment<br>• Food Safety Economics |
| GIS Fundamentals | Food Safety Law<br>• International Food Law<br>• Intellectual Property Rights and Management |
| Risk Communication and Perception | Supply Chain Safety<br>• Food Security<br>• Risk Management in Food Chains and Logistics<br>• Microbiology<br>• Food Law |
| Risk, Toxicology, Exposure and Health | |
| Environmental Policy and Risk Governance | |
| Pollution Prevention and Remediation Technologies | |
| Modelling Environmental Processes | |
| Evaluating Sustainability | |

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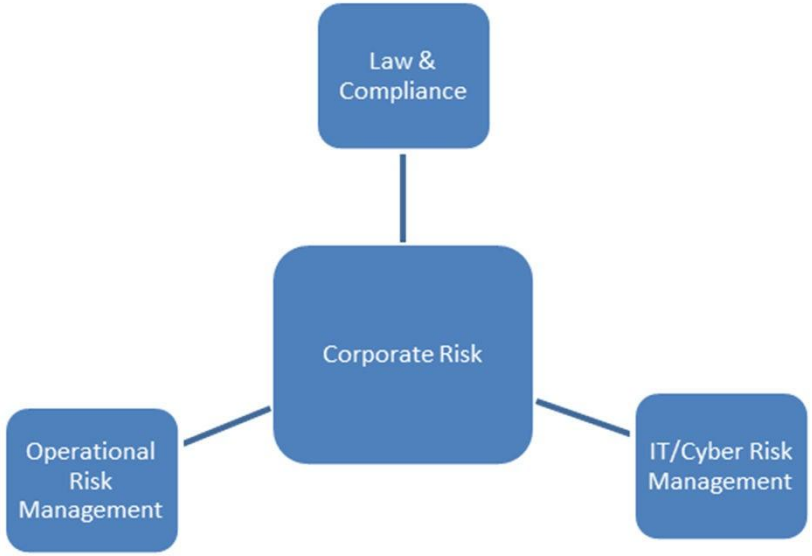
# Typical contents of programs

## Cluster corporate risk



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# Typical contents of programs

## Typical curricula for specializations Law & Compliance, Corporate/Enterprise Risk Management and IT/Cyber Risk Management

| Law & Compliance | Corporate/Enterprise Risk Management | IT/Cyber Risk Management |
|---|---|---|
| (Int'l) Business Organizations | Enterprise Systems Risk Management | Principles of Risk Management |
| (Int'l) Public Companies Practice | Methods of Enquiry: research and consultancy in finance | Corporate Risk Management Processes |
| (Int'l) Capital Markets and Loans Practice | Risk Financing and Insurance | Cyber Crime |
| (Int'l) Intellectual Property Practice | Total Risk Management | Insecurity and the Dark Web |
| (Int'l) Competition/Anti-trust Law and Practice | Corporate Governance and Ethics | The Management of Corporate Security |
| (Int'l) Mergers and Acquisitions Practice | Electronic Crime | Foundations of Cyber security |



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# Typical contents of programs

## Typical curricula for specializations Law & Compliance, Corporate/Enterprise Risk Management and IT/Cyber Risk Management

| | | |
|---|---|---|
| (Int'l) Joint Ventures Practice | Business Continuity and Crisis Management | Information Systems Management and Strategy |
| (Int'l) Arbitration Practice | Global Perspectives on Risk | Implementation of Cyber security |
| (Int'l) Commercial Law | Research Methods | Multivariate Statistics for Data Mining |
| | | Business Ethics |



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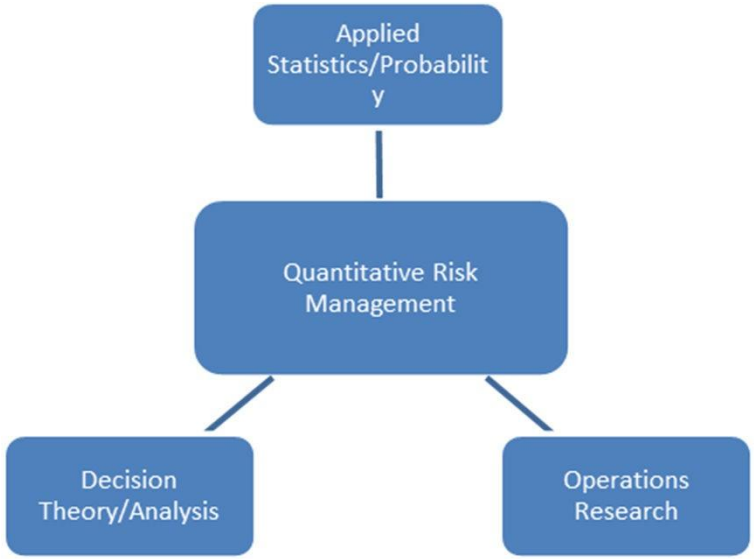
# Typical contents of programs

## Cluster quantitative risk management



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# Typical contents of programs

## Typical curricula for specializations Applied Statistics/Probability, Decision Theory/ Decision Analysis and Operations Research

| Applied Statistics/Probability | Decision Theory/Decision Analysis | Operations Research |
|---|---|---|
| (Applied) Stochastic Processes | Decision Theory | Applied Statistics and Business Forecasting |
| Insurance Mathematics | Risk Management | Mathematical Programming and Optimization |
| Computational Methods in Finance and Insurance | Decision Support Methods | Decision Behavior, analysis and Support |
| Stochastics for Derivatives Modelling | Scientific Communication | Global Operations Management |
| Probability and Measure | Business Intelligence in Computer and Systems Sciences | Managing Projects |
| Mathematics of the Black and Scholes Theory | Risk and Decision analysis | Strategic Supply Chain Management |



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# Typical contents of programs

## Typical curricula for specializations Applied Statistics/Probability, Decision Theory/ Decision Analysis and Operations Research

| | | |
|---|---|---|
| Quantifying Risk Modelling and Alternative Markets | Analysis of Basis for Decisions | Data Analytics for Business Decision Modelling |
| Time Series | Methodology of Decision Analysis and (Advanced) Applications | Risk, Performance and Decision Analysis |
| Probabilistic Methods in Risk Management and Insurance | Logic | Information and Knowledge Management |



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# Teaching and Learning

Problem based learning is common with various degrees of implementation with a mix of
- lectures
- individual research
- group projects/exercises

Internships are utilized as relevant and possible

Field trips - especially for natural hazards risk educations

Assessments of students follow the usual procedures
- written
- oral
- group work presentations



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# Observations/conclusions

- A boom in educational programs on risk over the past 5 years – not many of them academically strong
- Programs where Risk is explicit in the title are typically in English and have a strong international student component; traditional disciplines where Risk is implicit in the title or course of study tend to be geared toward domestic students and are taught in the country's mother tongue.
- Majority of risk programs lack a decision support component – critical for programs offered in the applied sciences
- Division between risk assessment and risk management remains strong in perception, in practice and in education
- Many programs lack a "red thread" or cohesion in their purpose and delivery
- The humanities are entirely absent from the risk research and education domain
- Risk Communication courses are weak, ineffective and offered as electives
- Risk Perception courses are almost never offered
- Socio-economic methods for risk acceptance criteria are almost never part of curriculum
- No programs link risk assessment with quantitative sustainability assessment
- Consequence modelling is almost entirely absent from the curricula
- Reputation of academic institution does not equate with quality of program



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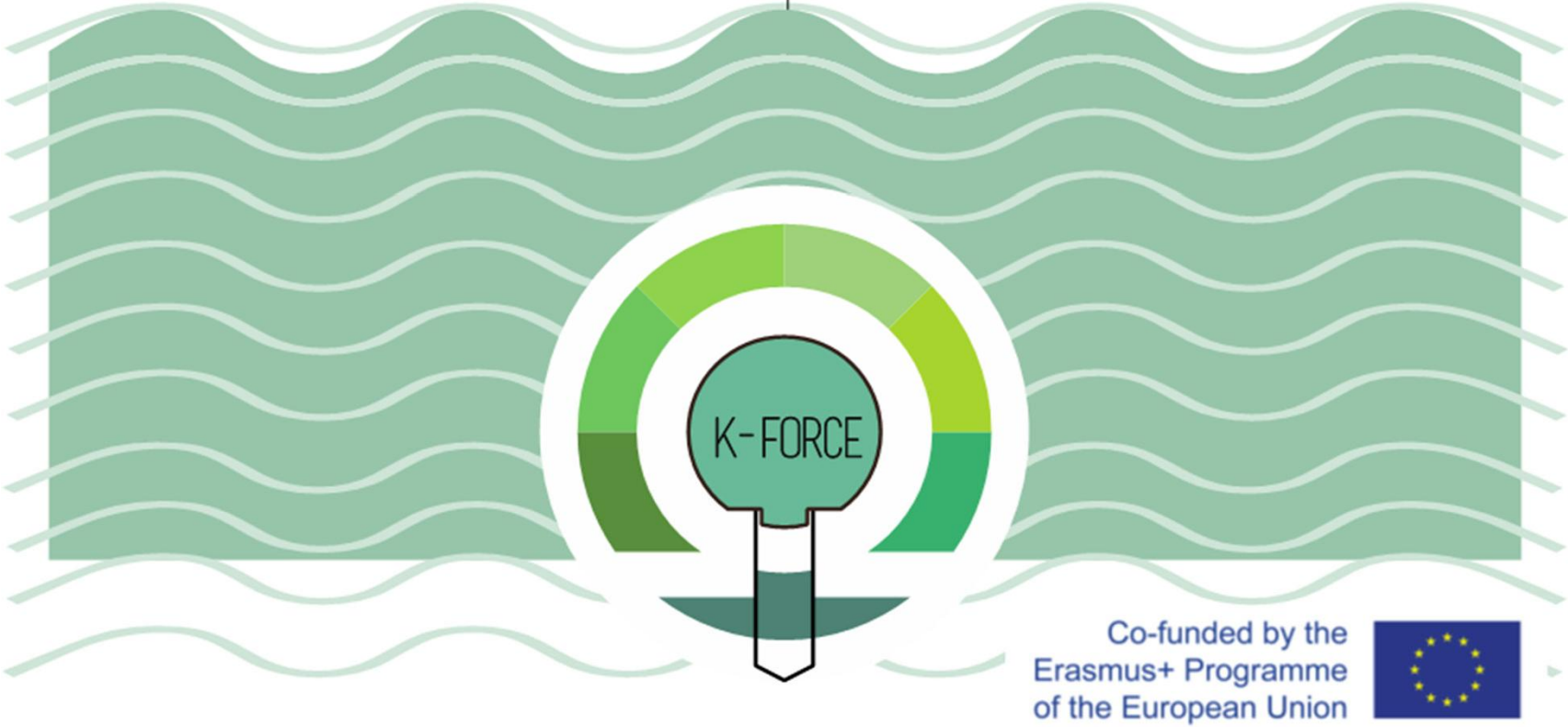


# Thank you
# for your attention

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