Welcome!
The Bachelor of Science degree in Global Responsibility and Leadership (GRL) is an initiative developed by the University of Groningen at Campus Fryslân, the Netherlands. The GRL program is a scientifically rigorous, inter- and transdisciplinary program dedicated to addressing global challenges and finding local solutions. The program is inspired by the 2030 UN Agenda for Sustainable Development and consists of input from Human and Social Sciences, Natural Sciences and Information Technology. The program is housed at University College Fryslân (UCF), in Leeuwarden.

Today's challenges reflect the dynamic and complex state of world affairs and cut across various academic disciplines. Solutions for these ‘wicked problems’ can no longer come from isolated improvements in one single area. They can only be addressed jointly by government, industry, civil society and academia. Sustainable, future-proof solutions require innovations by change agents and leaders educated in methods of transdisciplinary research. This is what the GRL degree will offer you.

In this study guide, you will find information on our educational concept, the curriculum, an example of a weekly schedule, and all the course descriptions. On the last page, you will find our contact information. Please do not hesitate to use that if you have any further questions.

We look forward to welcoming you in Leeuwarden.

Warm regards,
The UCF Team
The GRL programme consists of four main components that need to be fulfilled throughout the three years.

Foundation (40 EC)
The eight courses in the Foundation of the GRL programme address different perspectives on global challenges and offer the domains in which the global-local relationship is negotiated. The Foundation consists of core courses in economics, political science, psychology, earth systems science, global health, Information Technology and the Leadership Seminar.

Skills Lab (30 EC)
The courses in the Skills Lab provide a solid foundation in academic communication techniques and research methodology. Intercultural communication and collaboration skills are additionally developed. The Skills Lab consists of core courses in academic communication, language and culture, statistics and interdisciplinary research design and qualitative methods.

Major (80 EC)
At the end of your first year, you chose your major and determine your own path throughout the GRL programme. You can opt for one of our three majors: Responsible Planet, Responsible Economy & Politics or Responsible Humanity. In addition, you complete two Living Lab projects and conclude the degree with your Capstone.

Living Lab projects
The LL projects entail the transdisciplinary integration of academic and non-academic knowledge with regard to developing sustainable (local) solutions to current global challenges. During the LL projects, you work together with private and public stakeholders and learn how to translate a real-world question into a question suited for academic research, do the research, and then translate your findings back into recommendations for the stakeholder.

Capstone
You complete the third year with a Capstone project, which is the academic culmination of your degree. The Capstone meets the standards and requirements of (semi-independent) academic research, but does not have to take the form of a traditional thesis. You are encouraged to decide for yourself how to complete your degree and to present the project in a creative way, for example by developing an app, filming a public service announcement, designing a product, writing a policy paper, creating a theatre production.

Minor (30 EC)
The third year minor gives you the opportunity to individualise your programme even further. Most students will opt for an exchange semester at a university abroad, but you can also use the minor to do an internship or to fulfil pre-master requirements within another Faculty at the University of Groningen or another university in the Netherlands or abroad.

General course information
All our courses are required to take six courses per semester (3 courses per term), which are each worth 5 EC. In the first year, you take 7 Foundation courses, 3 Skills Lab courses and 2 of your chosen major courses.

After the first year, you chose your Major: Responsible Planet, Responsible Economy & Politics or Responsible Humanity. Within your major, you have to complete at least two tracks. A track consists of a 300-level course and at least two other courses (usually prerequisites) in the same field of study.

In the second and third year, you take 1 Foundation course, 3 Skills Lab courses and 1 Ethics course specified to your major. All other courses are courses chosen within (or even outside of) your major.

In the major, courses are offered at three different levels:
- 100-level (introductory): courses have no prerequisites and, unless specified otherwise, are open to all students.
- 200-level (intermediate): courses have prerequisites and are only open to students who have successfully completed one or more courses at 100-level.
- 300-level (advanced): courses have prerequisites and are only open to students who have successfully completed one or more courses at 100 and 200-level.

University College Fryslân
The Earth System

Course content
This course provides a general introduction into the mechanisms that determine the dynamics of the Earth system in the past, present and future. For example, the course deals with the role of the biosphere in climate- and global change and, vice versa, the loss of biodiversity associated with climate- and global change. The course builds on integration of disciplinary knowledge on Earth system processes such as hydrology, meteorology and biogeochemistry. It introduces the systems approach to study Earth system dynamics involving different temporal and spatial scales in process interactions and feedback mechanisms that explain observed climate- and global change. Emphasis is on Earth system interactions associated with dynamical, physical and biogeochemical processes affecting the state of the atmosphere, biosphere and hydrosphere under natural and anthropogenic conditions. The course’s lectures are complemented with an intensive modelling practical, including the search for information on the Earth system. In this course there is also an introduction into the ethical and philosophical context of global and climate change issues.

Literature
Compulsory literature
Course manual and additional papers that will be used in the assignments

Course learning outcomes
Upon the successful completion of this course, students will be able to:
- Understand and apply the systems approach in the context of climate- and global change issues;
- Summarise the major Earth system compartments and associated dynamical, physical and biogeochemical processes;
- Recognise the spatial and temporal scales issues related to climate and global change;
- Demonstrate an insight into the regulation of environmental processes by Earth system compartment interactions and the role of feedback mechanisms;
- Distinguish between natural and anthropogenic factors affecting the climate- and Earth system;
- Formulate a basic view on ethical and philosophical considerations on Earth system theories;
- Develop and apply a simple model of Earth system components including the role of process interactions and feedback mechanisms;
- Find relevant information in literature, databases and other sources of information in support of conducting Earth system analysis;
- Apply the gained knowledge and analysis skills to assess the role of fundamental Earth system processes in past- and present climate and global change which is essential to evaluate mitigation and adaptation strategies to cope with future climate and global change.

Assessment
10% Average of weekly Blackboard tests on presented content lectures
40% Multiple-choice/open question exam
20% Earth system modelling assignment
10% Information literacy assignment
10% Climate change ethics and philosophy assignment
10% Active participation in lectures and fieldwork / practicals
**Title of course**: The Earth System

**Assessment requirements**
Attendance of all classes is mandatory. This means that students must actively participate in at least 80% of the classes. In the event of absence of up to 20%, the instructor may stipulate replacement assignments. Absence of more than 20% will result in the student being banned from further participation of the course unit and from the examination. If students do not attend the first class, they will not be able to take the course.

**Earth system modelling assignment**
This assignment involves a 1 ½ week research project in which the students, collaborating with 2-3 other students, define a climate- or global change research question they deem being interesting to investigate in depth. This research question will be addressed collecting information in literature and datasets also applied to develop and apply a modelling system implemented in a programming environment called SMART (developed at Wageningen University). At the end of the project the students have to present the main results of their research project and provide feedback to the projects of the other groups.

**Assessment criteria:**
1. development of research proposal including definition of research question, hypothesis, system diagram, data availability for model evaluation
2. originality of research plan and modelling system to be developed and applied
3. active participation and management of tasks to be conducted by the group
4. presentation
5. providing feedback

**Information literacy assignment**
This assignment involves attending a lecture followed by practicals in which the students get instructions on the efficient use of information in peer-reviewed literature and datasets also to be applied for the development of the Earth system modelling system.

**Assessment criteria:** grade of online test on presented information in lecture and practicals

**Climate change ethics and philosophy assignment**
This assignment involves the writing of an advice to the prime-president regarding the application of geo-engineering options (e.g., Solar Radiation Management, SRM, and Carbon Dioxide Removal, CDR) to cope with climate change. This assignment is also conducted by groups of 3-4 students and which requires to reach consensus on the arguments about the (dis)advantages and ethical issues associated with different geo-engineering options. This activity includes debating, reasoning and recognising ethical theories in the provided arguments for their advice on the geo-engineering options which are explained in more detail in a number of papers that must be read in preparation for this assignment.

**Assessment criteria:** quality of the written advice to the prime-minister.
Assessment requirements
Attendance of all classes is mandatory and active participation is an integral part of assessment (and a component of the final grade). This means that students must actively participate in at least 80% of the classes. In the event of absence of up to 20%, the instructor may stipulate replacement assignments. Absence of more than 20% will result in the student being banned from further participation of the course unit and from the examination. If students do not attend the first class, they will not be able to take the course.

The course contains 5 assignments. Each of the assignments is weighed as 20%. The assignments will be evaluated regarding the following criteria:

Simulation exercise: Political Negotiations:
Students will conduct a mock political negotiation regarding access in a humanitarian crisis.
Assessment criteria are:
- Preparation of content
- Argumentation coherent and logical
- Negotiation style compelling and convincing

Reviewing a fundamental book (paper and presentation)
Assessment criteria are:
- Structure
- Referencing
- Style
- Accuracy of the review
- Critical Reflection
- Identification of relation to the course themes

Conduct and present a political analysis: Current Crisis Report (presentation)
Assessment criteria are:
- Oral presentation style
- Quality of the slides/visualisation
- Quality of the analysis

Create a website
Students will create a website (Blog or Wiki) for learning and reflection. The purpose is to consolidate the knowledge gained and to prepare an expandable database for the current and future years. Assessment criteria are:
- Structure of the overall platform (Blog/Wiki etc.)
- Utility of Visualisation, Video, Data and Multimedia to enhance understanding
- Accuracy of summary and reflection on the literature

Think Big: Design and present a political solution to a global problem or SDG (paper and presentation)
Assessment criteria of the written component are:
- Structure
- Referencing
- Style
- Quality of the arguments
- Quality of the literature review
- Logical consistency between problem and solution

Assessment criteria of the oral component are:
- Oral presentation style
- Quality of slides/visualisation
The course aims at understanding human behaviour within the context of individual, social, cultural and environmental factors. We will examine how these factors influence people’s behaviour, cognition, and thinking as well as the way people make choices. Basic research methods and theories from social psychology (social cognition, social influence, group processes etc.) are covered, giving students a clear insight into the psychological perspective and methodology. Notably, why sustainable development is a behavioural problem is a central question in the course. We will therefore put emphasis on examining how theories could help understand the antecedents of human behaviour in relation to sustainability, and promote sustainable development. In particular, the course will address the Sustainable Development Goals of 3 (good health & well-being), 5 (gender equality), 7 (affordable & clean energy), 10 (reduced inequalities), 11 (sustainable cities & communities), 12 (responsible consumption & production), 13 (climate action), and 16 (peace, justice and strong institutions).

Upon the successful completion of this course, students will be able to:

- Identify and explain key theories, concepts, methods and debates in social psychology
- Compare and evaluate different theories, concepts, and methods in social psychology
- Reflect on individual, social, cultural and environmental factors shaping human behaviour
- Reason why a theory-driven approach is needed to understand human behaviour
- Use theories to reflect on the roots of global sustainability challenges
- Write an academic essay discussing relevant social psychological theories to understand the roots of global sustainability challenges
- Present their ideas in an academically sound way
- Discuss their ideas with peers and critically challenge ideas of others

Students will work on an essay throughout the course, which comprises 40% of their grade. Learning outcomes 1, 4, 5 and 6 will be addressed by the essay. Students could choose from a list of topics that will be announced in the first week of the course. The topics will cover global sustainability challenges that are linked to the Sustainable Development Goals of the UN. In the essay, students will first introduce the sustainability challenge they are working on, discuss a relevant social psychological theory that could be used to understand the roots of the problem, and have theory-driven conclusions.

Students will receive feedback on their drafts half-way through the course. The final evaluation of the essay will be based on a grading rubric that covers the structure of the essay (whether the three parts were organized well content-wise), the scope and depth of critical thinking during argumentation, the flow of the essay and whether language and APA-style are used correctly throughout the text. An example rubric will be provided under the course’s site.

Students will present the work from their essays at the end of the course in two sessions. Learning outcomes 1, 4, 5 and 7 are covered with this assignment.

Assessment:
- 10% Presentation
- 10% Active participation
- 40% Written exam
- 40% Written assignment: essay (15% from the first draft, 25% from the final draft)
Course content

Upon the successful completion of this course, students will be able to:

- Explain and apply basic microeconomic principles of consumer and producer theory, among which demand and supply functions, competitive market equilibria, public goods and externalities, and the distortive impact of taxes, subsidies and rationing, and of non-competitive market forms.
- Explain and apply basic macroeconomic principles, among which national accounting and circular flow, open and closed macroeconomic models, and the distinction between short-run and long-run macroeconomic analysis.
- Explain and apply basic principles of international trade theory, among which comparative advantage, trade protection, balance of payments, exchange rate and purchasing power parity.

Assessment

10% Active participation
40% Written exam with open questions
50% 5 written assignments with open questions in groups of 2 students (10% each)

Assignments

Assessment requirements

Attendance of all classes is mandatory. This means that students must actively participate in at least 80% of the classes. In the event of absence of up to 20%, the instructor may stipulate replacement assignments. Absence of more than 20% will result in the student being banned from further participation of the course unit and from the examination. If students do not attend the first class, they will not be able to take the course.

Problem sets

Students have to complete five written assignments based on open questions (problems) taken from the textbook. They work together in groups of two, but are individually assessed. Each assignment (individually assessed) counts for 10% of the final grade.

Final exam

Students have to complete a final exam in week 10. The entire exam consists of open questions. The problem sets are in fact preparatory for the final exam.

Active participation

Students are expected to actively participate in all seminars, by being present, asking questions and discussing the material during class discussions or activities.
<table>
<thead>
<tr>
<th>Title of course</th>
<th>Introduction to Global Health</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>5. Stakeholder analysis and SDGs: what are the main actors in health? International health institutions.</strong> What do we mean precisely with the public, private and NGO sector when talking about the health sector and what are their roles and why is it important to create public-private partnerships for health? Who are other important stakeholders in the health sector? We discuss the value of cooperation in addressing global health problems. We zoom in on specific country situations. In the final theme we zoom in on the health related SDGs: what are the 13 proposed targets and 26 proposed indicators? In this final theme we recapitulate the previous themes and bring all elements together. Students will have sufficient overview to put the health-related SDGs in context.</td>
<td></td>
</tr>
</tbody>
</table>

**Literature**

**Compulsory literature**


This book will be used as background reading in all themes. The book has case studies (vignettes) of all themes that will be used, as well as questions for group discussions that will be posed. Linked to this book there are online materials for in-depth study and additional background materials. In addition, literature dedicated per theme will be used during each week.

**Course learning outcomes**

This course unit focuses on the development of the following learning outcomes, as stated in the degree profile such as at the end of the course the following is achieved:

**Theme 1 Definition of Health**

Knowledge: student will have knowledge about the different definitions and different scientific discourses. Students will understand the theoretical socio-cultural and bio-medical model of health and the principles of health behaviour and health promotion.

Skill: Students will be able to reflect on their own perceptions on health in a global context, and be able to present in writing their views. They will be able to debate on relevant differences between bio-medical and socio-cultural health model. They will be able to design (in pairs) simple health promotion messages for actual health threats in an innovative way.

**Theme 2 Determinants of Health**

Knowledge: students will have a basic understanding of what determinants of health are and what their influence on health is (political, biological, etc.). They will be able to analyse health cases and debate how determinants relatively influence these health cases.

Skill: analysis, argue position, debating

**Theme 3 Global Burden of Disease**

Knowledge: students will understand the fundamentals of epidemiology and trends in health and disease. They will be able to differentiate between communicable and non-communicable diseases.

Skills: they will be able to conduct the basic literature search and critical analysis. They will be able to determine trends in simple data sets. Students will be able to present their findings to their colleagues, and critically reflect on presentations of other students.

**Theme 4 Health systems analysis**

Knowledge: students will have a basic understanding about health systems and building blocks (WHO model) and differences in countries.

Skills: will be able to take responsibility of resource allocation in a health system in collaboration with colleague. Students will be able to argue why they chose for certain allocations.

**Assignments**

**Assessment requirements**

Attendance of all classes is mandatory. This means that students must actively participate in at least 80% of the classes. In the event of absence of up to 20%, the instructor may stipulate replacement assignments. Absence of more than 20% will result in the student being banned from further participation of the course unit and from the examination. If students do not attend the first class, they will not be able to take the course.

**Theme 1 Definition of Health**

- Health promotion intervention in couples. Each student is expected to participate equally (5% of grade); written individual essay (reflection max 1000 words), assessment of reflection competency, academic writing 10% of grade

**Theme 2 Determinants of Health**

- analysis of case study, presentation and feedback, assessment of analytic skills and presentation skills 15% of grade

**Theme 3 Global Burden of Disease**

- Collaboration, country analysis presentation, literature list, assessment of analytic skills presentation skills, academic skills 25% of grade

**Theme 4 Health systems analysis**

- Observation during serious district game, assessment of leadership and collaboration 10% of grade; short essay (max 1000 words) about health insurance topic 15%

**Theme 5 Stakeholders analysis and SDGs**

- Written essay (paper max 1500 words), assessment of academic skills synthesis skills, advocacy skills 20% of grade
Introduction to Programming

Course content
Introduction to Programming aims at getting students acquainted with algorithms, algorithmic problem-solving and programming. We start with a brief history of computers, their main elements and limitations. Then we introduce notions of computer programmes and algorithms. The course continues with an introduction to algorithms and algorithmic modelling, learning basic concepts such as conditions and iteration flows (loops). Subsequently, students are introduced to computers and programming, learning to translate algorithms into programmes. Students learn basic data structures, like character strings, arrays and sets, as well as programming structures, like variables, function calls and recursions.

The Python programming language is used during the course to explain and practice programming concepts. Therefore, students also learn to develop, compile and run source code written in this language. Algorithmic and programming concepts presented in the course are illustrated by examples in the scope of the GRL curriculum, such as decision-making, data analysis and visualisation of geographical data, all related to the SDG’s.

Course learning outcomes
Upon the successful completion of this course, students will be able to:
- List the main components of computers and computer programmes
- Identify problems that can be solved with algorithmic solutions and define the problem space
- Resolve problems algorithmically and translate algorithms into software solutions
- Implement basic software solutions using the Python programming language
- Assess the solution against functional and non-functional requirements
- Judge and be critical towards the quality of their own work

Assessment
10% Active participation
20% Computer exercises
25% Written exam
45% Project (algorithm modelling and programme implementation)

Assignments
Assessment requirements
Attendance of all classes is mandatory. This means that students must actively participate in at least 80% of the classes. In the event of absence of up to 20%, the instructor may stipulate replacement assignments. Absence of more than 20% will result in the student being banned from further participation of the course unit and from the examination. If students do not attend the first class, they will not be able to take the course.

Computer exercises
Between the second and ninth week, the students have to deliver seven mandatory computer exercises and may deliver one (last) optional computer exercise. These exercises are made by each student individually. During the scheduled practical sessions, the students are encouraged to discuss the exercises with each other and the teacher. The students submit their solutions to a system that will perform elementary checks and store the source code. Each solution is subsequently manually inspected and grade accordingly.

Literature
Compulsory literature

Tea Press (online: http://greenteapress.com/wp/think-python-2e)

Downey, A. (2015). Think Python: How to Think Like a Computer Scientist. (2nd ed.) USA: Green

Tea Press (online: http://greenteapress.com/wp/think-python-2e)

Upon the successful completion of this course, students will be able to:
- List the main components of computers and computer programmes
- Identify problems that can be solved with algorithmic solutions and define the problem space
- Resolve problems algorithmically and translate algorithms into software solutions
- Implement basic software solutions using the Python programming language
- Assess the solution against functional and non-functional requirements
- Judge and be critical towards the quality of their own work

Assessment
10% Active participation
20% Computer exercises
25% Written exam
45% Project (algorithm modelling and programme implementation)

Assignments
Assessment requirements
Attendance of all classes is mandatory. This means that students must actively participate in at least 80% of the classes. In the event of absence of up to 20%, the instructor may stipulate replacement assignments. Absence of more than 20% will result in the student being banned from further participation of the course unit and from the examination. If students do not attend the first class, they will not be able to take the course.

Computer exercises
Between the second and ninth week, the students have to deliver seven mandatory computer exercises and may deliver one (last) optional computer exercise. These exercises are made by each student individually. During the scheduled practical sessions, the students are encouraged to discuss the exercises with each other and the teacher. The students submit their solutions to a system that will perform elementary checks and store the source code. Each solution is subsequently manually inspected and grade accordingly.

Literature
Compulsory literature
Downey, A. (2015). Think Python: How to Think Like a Computer Scientist. (2nd ed.) USA: Green

Tea Press (online: http://greenteapress.com/wp/think-python-2e)

Tea Press (online: http://greenteapress.com/wp/think-python-2e)

Tea Press (online: http://greenteapress.com/wp/think-python-2e)

Upon the successful completion of this course, students will be able to:
- List the main components of computers and computer programmes
- Identify problems that can be solved with algorithmic solutions and define the problem space
- Resolve problems algorithmically and translate algorithms into software solutions
- Implement basic software solutions using the Python programming language
- Assess the solution against functional and non-functional requirements
- Judge and be critical towards the quality of their own work

Assessment
10% Active participation
20% Computer exercises
25% Written exam
45% Project (algorithm modelling and programme implementation)

Assignments
Assessment requirements
Attendance of all classes is mandatory. This means that students must actively participate in at least 80% of the classes. In the event of absence of up to 20%, the instructor may stipulate replacement assignments. Absence of more than 20% will result in the student being banned from further participation of the course unit and from the examination. If students do not attend the first class, they will not be able to take the course.

Computer exercises
Between the second and ninth week, the students have to deliver seven mandatory computer exercises and may deliver one (last) optional computer exercise. These exercises are made by each student individually. During the scheduled practical sessions, the students are encouraged to discuss the exercises with each other and the teacher. The students submit their solutions to a system that will perform elementary checks and store the source code. Each solution is subsequently manually inspected and grade accordingly.

Literature
Compulsory literature
Downey, A. (2015). Think Python: How to Think Like a Computer Scientist. (2nd ed.) USA: Green

Tea Press (online: http://greenteapress.com/wp/think-python-2e)

Downey, A. (2015). Think Python: How to Think Like a Computer Scientist. (2nd ed.) USA: Green

Tea Press (online: http://greenteapress.com/wp/think-python-2e)

Upon the successful completion of this course, students will be able to:
- List the main components of computers and computer programmes
- Identify problems that can be solved with algorithmic solutions and define the problem space
- Resolve problems algorithmically and translate algorithms into software solutions
- Implement basic software solutions using the Python programming language
- Assess the solution against functional and non-functional requirements
- Judge and be critical towards the quality of their own work

Assessment
10% Active participation
20% Computer exercises
25% Written exam
45% Project (algorithm modelling and programme implementation)

Assignments
Assessment requirements
Attendance of all classes is mandatory. This means that students must actively participate in at least 80% of the classes. In the event of absence of up to 20%, the instructor may stipulate replacement assignments. Absence of more than 20% will result in the student being banned from further participation of the course unit and from the examination. If students do not attend the first class, they will not be able to take the course.

Computer exercises
Between the second and ninth week, the students have to deliver seven mandatory computer exercises and may deliver one (last) optional computer exercise. These exercises are made by each student individually. During the scheduled practical sessions, the students are encouraged to discuss the exercises with each other and the teacher. The students submit their solutions to a system that will perform elementary checks and store the source code. Each solution is subsequently manually inspected and grade accordingly.

Literature
Compulsory literature
Downey, A. (2015). Think Python: How to Think Like a Computer Scientist. (2nd ed.) USA: Green

Tea Press (online: http://greenteapress.com/wp/think-python-2e)

Downey, A. (2015). Think Python: How to Think Like a Computer Scientist. (2nd ed.) USA: Green

Tea Press (online: http://greenteapress.com/wp/think-python-2e)
### Introduction to Programming

The final grade for the groups is based on the final deliverable (report and source code) and presentations. The weight and evaluation criteria for each grade component are the following:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
<th>Criteria</th>
</tr>
</thead>
</table>
| Design    | 40%    | - Argumentation of motivation and application  
- Discussion of implications  
- Quality of requirements  
- Quality of model |
| Implementation | 40% | - Completeness of implemented solution (compared against design)  
- Correctness of source code  
- Quality of source code  
- Quality of documentation |
| Presentation | 20% | - Quality of presentation  
- Quality of questions  
- Quality of answers  
- Quality of feedback |

After the second presentation, the members of every group deliver a peer-assessment form, which is used to identify outstanding and/or underperforming members, which may result in individual changes in the grade.

**Active participation**

The lecturer assesses every student individually regarding their participation throughout the course. The students are evaluated according to the following active participation rubric.

---

### Introduction to Data Science

Data Science is a fast-growing field that combines statistics and several fields of IT to provide theoretical and practical tools for exploring and solving data-related problems. Among its possible applications, data science is a powerful tool to support addressing global challenges, as they often involve reasoning based upon diverse and sizeable data. This course aims at developing a minimal set of skills necessary to start applying data science to real-world problems. For that, students are introduced to several topics related to three main components: data retrieval, visualisation and analysis. The basic techniques are practised throughout the course with weekly computer exercises, and the students demonstrate their acquired skills in a non-trivial project for analysing a real-world dataset. Finally, the course also briefly tackles societal and ethical implications related to the studied topics.

Topics on data retrieval include traditional file-based datasets, database technologies, and streaming. Topics on data visualisation include reporting and plotting, qualities of visualisations, translation of statistical measures into visualisation, and visualisation best practices. Topics on data analysis include basic statistical tests, data clustering and machine learning. All data used and analysed are related to the global goals and as encountered / used by corporations, organisations and governments.

**Literature**


**Course learning outcomes**

Upon the successful completion of this course, students will be able to:

- Summarise the theory behind data science  
- Understand the context of datasets  
- Inspect, filter, analyse and visualise datasets  
- Integrate and reorganise different datasets  
- Hypothesise and forecast observations about datasets  
- Apply basic machine learning algorithms to datasets  
- Take responsibility on the usage of data (e.g. privacy and security concerns)  
- Reason to support decision making  
- Judge and criticise their own work

**Assessment**

- 10% Active participation  
- 20% Computer exercises  
- 25% Written assignments  
- 45% Project
Title of course: Introduction to Data Science

Assessment requirements
Attendance of all classes is mandatory. This means that students must actively participate in at least 80% of the classes. In the event of absence of up to 20%, the instructor may stipulate replacement assignments. Absence of more than 20% will result in the student being banned from further participation of the course unit and from the examination. If students do not attend the first class, they will not be able to take the course.

Computer exercises
Between the second and ninth weeks, the students have to deliver seven mandatory computer exercises and may deliver one (last) optional computer exercise. These exercises are made by each student individually. During the scheduled practical sessions, the students are encouraged to discuss the exercises with each other and the teacher. The students submit their solutions to a system that will perform elementary checks and store the source code. Each solution is subsequently manually inspected and grade accordingly.

The grading is computed as the mean of all exercises. However, the students cannot miss (not submit) more than one exercise. If submitted, the last optional computer exercise will replace the worst grade.

Written exam
This is a multiple-choice exam with the following grading system. We design the exam supposing that the student can answer 25% of the questions correctly by simply guessing the answer. Therefore, we first subtract 25% of the total number of questions from the score and calculate the grade based on the percentage of correct answers.

Project
Between the second and ninth weeks, the students develop a data science project. This project has to be executed by groups of 3 students (one group may have 4 students). The students organise themselves into groups. The idea for the project is decided by the group together with the lecturer, who will help the students decide the scope (size) of the project. The groups submit partial deliverables every week, for which they receive feedback that have to be applied in the next iteration.

The project comprises two deliverables: report (document) and implementation (source code). The report has three main components: (a) motivation; (b) planning (research design); (c) execution; (d) discussion of results. The implementation is a documented script that executes every step of the planned study: (a) read dataset; (b) treat data (normalisation and missing values); (c) create visualisations; (d) perform and display analysis (e.g., statistical tests).

There are two presentations along the eight weeks of the project’s development. The first presentation happens in the fourth week (i.e., fifth week of the course) and the groups present the design component. The second presentation happens in the eighth week (i.e., ninth week of the course) and comprise revisions of the design component and the implementation component.
In this course, students learn to develop strategies for finding and analysing relevant academic literature and presenting these findings in an academic manner, both written and verbal. Students learn to recognise and discuss patterns of reasoning and express complex ideas in academic work through argument structure and persuasive reasoning. Learning to provide peer feedback and self-reflection on performance are also part of the programme, next to essential study skills such as online library use, referencing requirements and avoiding plagiarism. Throughout the course, students will apply these skills in written and verbal assignments, the content of which is related to the SDGs. This course supports and enhances students’ academic performance in every other course of the GRL bachelor.

Upon the successful completion of this course, students will be able to:

- Give and receive feedback and reflect on their own performance
- Give a structured presentation, using persuasive techniques to get their point across
- Perform a literature review on the state-of-the-art of a field or topic of their choosing (related to SDG’s), as a basis for elaborating a testable hypothesis
- Find and use relevant literature and distinguish what is academically sound and relevant
- Analyse academic texts
- Reference used sources correctly and avoid plagiarism (research integrity)
- Give a structured presentation, using persuasive techniques to get their point across
- Give and receive feedback and reflect on their own performance

Assessment is based on (provided in a rubric):
- A completed feedback form
- Encouraging, positive feedback that is specific
- Constructive comments: clear and specific tips for improvement
- Use of concrete examples to demonstrate how something could be improved
- Self-reflection on the way the given feedback was perceived and on how to improve giving feedback

Presentation

Students give a 15 min presentation on a topic that is related to the SDGs. The topics are approved by the lecturer.

Assessment is based on (provided in a rubric):
- structure and clarity of the presentation
- use of primary and secondary sources
- ability to deliver a presentation in front of an audience: use of intonation, articulation, speed, body language, eye contact, audience engagement
- use of English (grammar, style, structure)
- ability to handle questions

Academic paper

Students write a 3000w academic paper on a topic that is related to the SDGs (different than the topic of the position paper). The topics are approved by the lecturer.

Assessment is based on (provided in a rubric):
- argument structure (consistency of introduction, argument and conclusion)
- clarity of the argument
- analytical skills with regard to the material consulted: ability to comprehend synthesize and use relevant academic literature
- independence in searching for and processing literature (including APA referencing)
- use of academic English: structure, word-use, style and grammar
Language and culture have a direct influence on how we see the world. Our individual values and beliefs shape the way in which we perceive concepts and practices. In a globalised world, we constantly come into contact with people whose background and viewpoints diverge from our own. These varying outlooks can lead to difficulties in mutual understanding and communication.

This course is dedicated to understanding the role that language and culture have on the practice of science. Through the use of case studies and interactive assignments (linked to the SDG’s where possible), students will come to understand the complex interplay between language, culture, knowledge and communication from the viewpoint of different disciplines including sociology, social psychology and anthropology.

Students will be challenged to reflect on their own identity and discuss how it impacts on the way they perceive the world and engage with people around them. The notion of diversity will be discussed in detail, with a key focus on how their own concept of diversity influences their worldview. Additionally, students will reflect on how communication differs between cultures and how this can impact on effective communication. Students will further develop the academic communication skills first introduced in Fundamentals of Academic Communication I.

The courses also make use of a reader of supplementary articles and current newspaper articles. This can impact on effective communication. Students will further develop the academic communication skills first introduced in Fundamentals of Academic Communication I.

In-class group presentation
- These presentations will act as the starting point for discussion in the workshop sessions.
- Each presentation should include an interactive component which could include: Mentimeter, video, quiz etc.
- The presentation will be assessed on the basis of the following criteria:
  - ability to convey an original idea and how it relates to the broader context of the topic
  - ability to deliver a presentation in front of an audience
  - ability to consult different academic articles, newspapers, online periodicals, etc. when collecting data for the presentation in order to present a holistic view
  - These presentations will act as the starting point for discussion in the workshop sessions.

The presentation plan will be assessed on the basis of the following criteria:
- structure and clarity of the argument (consistency of introduction, argument and conclusion)
- ability to formulate a clear and relevant research question
- ability to outline and plan a presentation
- quality of proposed bibliography

In-class group presentation
- Each student will deliver a group presentation (no more than 3 students per group) based on a current affairs event linked to the topic of a previous seminar. A list of relevant current events will be outlined in week 1. A self-chosen topic must be approved by the lecturer in advance.
- Students should consult different academic articles, newspapers, online periodicals, etc. when collecting data for the presentation in order to present a holistic view.
- Presentation topics should act like a case study to illustrate the topic.
- Each presentation should include an interactive component which could include: Mentimeter, Kahoot, video, quiz etc.
- These presentations will act as the starting point for discussion in the workshop sessions.

The presentation will be assessed on the basis of the following criteria:
- structure and clarity of the argument (consistency of introduction, argument and conclusion)
- ability to link presentation topic to theory discussed during the seminar sessions
- use of secondary, and if relevant, primary sources
- ability to deliver a presentation in front of an audience
- ability to work as a team (based on student self-assessment. Students will be asked to assess their contribution to the team by completing a self-assessment form.)
- relevance and execution of interactive activity

-听过精彩演讲的你，有何感受？
-请在评论区分享你的观点。
-与我们互动，赢取精美礼品！
### Language and Culture I

#### Mid-term essay plan
- Students are to hand in a short proposal (approximately 1 A4 page) outlining the research question, sections of the essay, and bibliography at the end of week 3.

The essay plan will be assessed on the basis of the following criteria:
- ability to formulate a clear and relevant research question
- clear focus of essay topic
- ability to outline and plan an essay topic

#### Mid-term essay
- Students are to write a 2,500 word (+/-10%) argumentative essay.
- The overarching theme for the essay is ‘How universal is experience?’
- Based on the concepts discussed during the first half of the course, students are to argue to what extent they think experience is universal.
- Students should develop a working title for their essay.
- Students should refer to topics and theories discussed during the course and reference outside sources.
- In addition, students should reflect on class discussions held during the course and use themes discussed to illustrate points made in their essay.

The essay will be assessed on the basis of the following criteria:
- structure and clarity of the argument (consistency of introduction, argument and conclusion)
- ability to comprehend and use relevant academic literature
- reflect on topics discussed in class
- use of secondary, and if relevant, primary sources
- analytical (and synthesizing skills) with regard to the material consulted
- independence in searching for and processing literature

#### Individual Poster Plan
- Students are to submit a short proposal (approximately 1 A4 page) outlining the research question, sections of the poster and bibliography.

The poster plan will be assessed on the basis of the following criteria:
- ability to formulate a clear and relevant research question
- ability to outline and plan a poster
- quality of proposed bibliography

---

### Individual Poster Presentation

- At the end of the term, students are to conduct an individual poster presentation on a topic linked to one of the themes discussed during the second half of the course.
- Students are to develop an appropriate research question and conduct complementary research.
- The poster should be created digitally.
- At the end of the term, students will present their posters at a poster showcase for students and staff.
- Students will also have to deliver a short 3 minute pitch on the topic of their poster to staff and students during the poster showcase.

The poster will be assessed on the basis of the following criteria:
- ability to identify a relevant research topic and construct a research question
- ability to present the research proposed in a coherent and visually attractive manner
- use of secondary, and if relevant, primary resources
- independence in processing literature
- analytical skills with regard to the material consulted
- ability to synthesise and defend the main points of the poster during the pitch. Students will be assessed on the validity of the argument they are attempting to make.
Attendance of all classes is mandatory. This means that students must actively participate in at least 80% of the classes. In the event of absence of up to 20%, the instructor may stipulate replacement assignments. Absence of more than 20% will result in the student being banned from further participation of the course unit and from the examination. If students do not attend the first class, they will not be able to take the course.

Computer assignments and Portfolio
Workshop Portfolio
Workshops will consist of a data problem from real world data, related to sustainable development (i.e. World Bank data), focused on the lecture content discussed that week. Students will analyse individually, with results to be collected in a portfolio. This portfolio should be self-contained, in terms of data, code for transformations and analyses, and analytical remarks by the students.

Workshop portfolio criteria are:
− Complete (all assignments should be included, code should run without problems)
− Correct (choice of analysis should be correct)
− Concise (no unnecessary clutter, in terms of code, analyses performed, and text)

Lecture portfolio
Consists of a weekly assignment of a newspaper clipping, article, or other media using statistics. Students are required to elicit the main point made, how the author arrived at that point, and if the methods used were correct.

Lecture portfolio criteria are:
− Complete (9 articles in total)
− Correct (assessment of the analysis by the author)
− Concise (assessment should be to the point)

Active Participation
This course will be very interactive and students will be expected to participate actively during lectures and workshop activities.

Final Exam
The final exam will be a written exam.
Courses year 2 and year 3

Foundation, Skills Lab & electives
- Leadership Seminar I: Leadership for Sustainable Change (200)
- Statistics II (200)
- Interdisciplinary Research Design & Qualitative Methods I (200)
- Language and Culture II (300)
- Leadership Seminar II: Leadership for Sustainable Change (300)
- Advanced Qualitative Methods II (300)
- Information Technology and its Implications (200)

MAJOR: Responsible Planet
- Environmental Ethics (200)

Earth system sciences track
- Ecosystem Processes & Services (100)
- Climate Change: Land, Air & Water (200)
- Climate Services and Global Governance (300)

Tourism track
- Sustainable Tourism (200)
- Hospitality Studies (300)

MAJOR: Economy & Politics
Moral Dilemmas in International Law and Politics (200)

Politics track
Politics track

Economics track
- History of Economic Thinking: Theory and Models (100)
- Behavioural Economics (200)
- 22nd Century Economy (300)

MAJOR: Responsible Humanity
- Development Ethics (200)

Global health track
- Contemporary Issues in Global Health (100)
- Innovative Technologies for Sustainable Development in Health (200)
- Comparative Health Systems and approaches to Health: Healthcare financing (300)

Psychology track
- Applied Social Psychology (100)
- Sustainable Decision-Making (200)
- Leadership and Change (300)

Visit the online course catalogue OCASYS for detailed information!

Weekly schedule year 1

Example Major Responsible Planet

Term 1

Monday
08:30 - 10:30 Fundamentals of Academic Communication
11:00 - 13:00 Introduction to Programming
14:00 - 16:00 Politics, Power & International Responsibility
16:00 - 18:00 Fundamentals of Academic Communication

Tuesday
Politics, Power & International Responsibility

Wednesday
Introduction to Programming

Thursday
Politics, Power & International Responsibility

Friday

Term 2

Monday
08:30 - 10:30 Statistics I
11:00 - 13:00 Applied Social Psychology
14:00 - 16:00 The Earth System
16:00 - 18:00 The Earth System

Tuesday
Applied Social Psychology

Wednesday
Statistics I

Thursday
Applied Social Psychology

Friday
The Earth System

Legend:
- Foundation
- Skills lab
- Major
- Minor
### Term 3

<table>
<thead>
<tr>
<th>Time</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:30 - 10:30</td>
<td>Governance and Politics: Responding to Global Challenges</td>
<td>Language &amp; Culture I</td>
<td>Introduction to Data Science</td>
<td>Language &amp; Culture I</td>
<td>Introduction to Data Science</td>
</tr>
<tr>
<td>11:00 - 13:00</td>
<td>Introduction to Global Health</td>
<td>Explaining Human Behaviour</td>
<td></td>
<td>Explaining Human Behaviour</td>
<td></td>
</tr>
<tr>
<td>14:00 - 16:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16:00 - 18:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Term 4

<table>
<thead>
<tr>
<th>Time</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:30 - 10:30</td>
<td>Governance and Politics: Responding to Global Challenges</td>
<td>Principles of Economics</td>
<td>Introduction to Global Health</td>
<td>Principles of Economics</td>
<td></td>
</tr>
<tr>
<td>11:00 - 13:00</td>
<td>Introduction to Global Health</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14:00 - 16:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16:00 - 18:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Legend:**

- Foundation
- Skills lab
- Major
- Minor