STUDYING DATA SCIENCE
OUTLINE

• Styles and levels of learning
• Study modes
• Teaching, learning and assessment methods
• Personal study plan in Data Science
• Model schedule of studies in Data Science
• More information related to studies
STYLES AND LEVELS OF LEARNING
LEARNING STYLES

• People are different and have different ways of learning, i.e., different learning styles

• There are many models of learning styles, for example,
  o Learning styles based on which sense is used (auditory, visual, kinaesthetic, tactile)
  o Learning styles based on different abilities (visual, aural, verbal, physical, logical, social, solitary)
LEARNING STYLES (2)

• Learning styles based on different abilities
  o Visual: prefer using pictures and images
  o Aural: prefer using sound and music
  o Verbal: prefer using words (speech and writing)
  o Physical: prefer using the body, hands and sense of touch
  o Logical: prefer using logic, reasoning and systems
  o Social (interpersonal): prefer to learn in groups or with other people
  o Solitary (intrapersonal): prefer to work alone and use self-study
LEARNING STYLES (3)

- By **recognizing and understanding your own learning styles**, you can use techniques better suited to you
  - Improves the speed and quality of your learning!

- People also have different approaches to (the level of) learning
  - Surface learning
  - Deep learning
LEVELS OF LEARNING

- **Bloom's Taxonomy** of Cognitive Levels of Learning (from 1958)
  - Knowledge
  - Comprehension
  - Application
  - Analysis
  - Evaluation
  - Synthesis

http://www.mrswatersenglish.com/2014/06/
LEVELS OF LEARNING REQUIRED

• Advanced learning skills
  • Manage your own studies
• High requirements
  • We do fail students!
• Deep level of learning
  • No grades with just remembering
• Learning in the focus
  • Very few obligatory events
STUDY MODES
DIFFERENT STUDY MODES

• Lecture courses
  o Weekly lectures and exercise sessions + course exam
  o May contain small reports, programs, etc

• Separate exams
  o Reading for the exam and taking the exam
  o Can be used as renewal or make-up exams of courses

• Project courses
  o Large project(s), typically team work

• Seminars
  o Report + presentation + review
COMPLETING COURSES

- Two ways
  - Lecture course
  - Separate exam
- Both require advance registration in Weboodi
- Register also for data science projects and seminars in Weboodi
- You can even register for the Master’s Thesis in Data Science in Weboodi, if you want to get additional support for your thesis work
LECTURE COURSES

• Usually 5 credits
• Consist of
  o Lectures
  o Weekly exercises
  o Sometimes a project work
  o Typically one course exam; some courses have also a renewal exam
• Always check details from the course homepage!

• NOTE: You must register both for the lecture course and the course exam separately in WebOodi
SEPARATE EXAMS

- Also called **general examination**
- Formally independent of the lecture courses
- Requirements are based on the material in the course description
- Duration 3.5 hours
- Registration for the separate exams also in WebOodi
- If you want the exam questions in English, contact the examiner two weeks before the exam
GENERAL ISSUES ON USED METHODS

• Teaching, learning and assessment methods used in courses at the departments vary a lot

• To know what kind of methods are used in a particular course
  o attend the first lecture, and
  o check the course web pages
LECTURE COURSES

• **A basic rule**: a 7-week course that yields 5 credits consists of
  - 2*2 hours lectures per week
  - 2 hours exercises per week

• Remember to schedule some **2 hours of independent work** per every classroom or exercise hour (or even more)

• But there are many courses that are organised differently, e.g.,
  - One lecture per week
  - One introductory lecture + individual or group work
FORMS OF LECTURES

• Lecturer may have prepared lecture slides
  o Usually available on the course pages after the lecture (or even before)
  o Students need to make notes only on the additional things

• Or lecturer just talks, gives maybe a few keywords or writes something on the blackboard
  o Students need to make notes totally themselves
FORMS OF LECTURES (2)

• Lectures may also be interactive
  o Discussion on some topics
    ▪ With the whole group of students
    ▪ In small groups (3-4 students)
    ▪ Pairwise
  o Ex tempore assignments
    ▪ Each student first tries to solve the task and then it is discussed together
    ▪ The solution is directly constructed together
FORMS OF EXERCISES

• Weekly home assignments/tasks
  o Students try to solve the given tasks individually or together with peer students before the exercise session

• In exercise sessions
  o One student is chosen to represent his/her solution to a task
  o The tasks are discussed first in small groups and then each group represents their solution to a task
  o The solutions are discussed together, and the teacher may show some example solutions to the tasks
FORMS OF SEMINARS

• Introductory session

• Schedules of presentations vary
  o One presentation per week during the whole term, reports ready approximately a week before the oral presentation
  o Reports are written during the first period of the term and oral presentations are held during the second period of the term
  o Reports are written during the whole term, and oral presentations are held at the end of the term in one session
LEARNING METHODS AND STYLES

• Most people learn
  o 10% of what they read
  o 20% of what they hear
  o 30% of what they see
  o 50% of what they see and hear
  o 70% of what they talk over with others
  o 80% of what they use and do in real life
  o 95% of what they teach someone else

(W. Glasser 1988)
APPROACHES TO LEARNING

• Being active while learning is better than being inactive

• Different approaches to learning
  o Surface learning
  o Deep learning
STUDY SKILLS

• In learning, we need different study skills
  o General study skills
  o Study skills that relate to learning particular content
  o Meta-cognitive learning skills (what to do in new contexts/situations)

• Development of your own study and learning skills is important!
GRADING

• The grading scale is divided into six steps (0-5)
  o 0 = Fail
  o 1 = Pass
  o 2 = Satisfactory
  o 3 = Good
  o 4 = Very good / Excellent
  o 5 = Outstanding

• Sometimes, the grading scale Pass/Fail is also used
ASSESSMENT IN COURSES

• On courses,
  o to gain the lowest passing grade, 1/5, a student usually needs to gain half of the maximum points
  o 5/6 of the maximum points usually gives grade 5/5
• Typically, the maximum number of points in a lecture course is 60 points. Then
  o for grade 1/5 you usually need to gather at least 30/60 points, and
  o for grade 5/5 you typically need to gather 50/60 points
• In some cases,
  o the maximum number of points can be higher or lower
  o the number of points needed for different grades can vary, too
ASSESSMENT IN COURSES (2)

• Different parts of the course can give you points for completing the course
  o Typically:
    ▪ at maximum 54 points from the exam,
    ▪ at maximum 6 points from the exercises
  o Can be:
    ▪ at maximum 30 points from the exam,
    ▪ at maximum 30 points from the exercises
  o Or something totally different!
ASSESSMENT IN COURSES
(3)

• Different parts may have thresholds that have to be met in order to complete the course
  o For example, you must get at least
    ▪ half of the maximum points given the exercises,
    ▪ half of the maximum points given in the exam, and
    ▪ half of the maximum points given all together.

• Check always which rules apply for the course in question!
ASSESSMENT METHODS USED IN COURSES

- Exams
  - Course, renewal or separate exam
  - Home exam
- Essay(s), article(s), report(s)
- Computer-assisted exercises
- Project work
- Self-assessment
- Peer-assessment
EXAMS

• Typically 3-5 questions per exam

• Length of the exams:
  o 2.5 h for a course exam
  o 3.5 h for a separate exam
  o 1-2 weeks for a home exam
EXAM QUESTIONS

• Different types of questions
  o Definitions of concepts and terms
    ▪ Briefly, precisely: “What does the concept X mean?” or “What is the basic idea in ...?”
    ▪ More thoroughly: “Explain in detail how the method X works?” or “Give a description of X and Y. What are their similarities and differences?”
  o Giving examples
    ▪ “What is X? Give an example ...” or “Give an example on how the algorithm works when ...”
EXAM QUESTIONS (2)

- Different types of questions (cont.)
  - Applying some algorithms or methods in a given scenario, with given data
    - “Let us assume that .... Explain what happens when ...”
    - “Give the values of X and Y, when the input to algorithm A is Z.”
  - Analysis or evaluation of a method
    - “In which cases method X works well?” or “How system X can avoid possible problems?”
  - Comparison of two or more methods
    - “When is algorithm X faster than algorithm Y?”
ASSESSMENT IN SEMINARS

• Based on
  o the report written on the given topic,
  o the oral presentation and
  o the activity of the participation in held sessions and discussions.
PERSONAL STUDY PLAN IN DATA SCIENCE
PLANNING OF STUDIES

• The size of the MSc degree is 120 credits
• The optimal study time is 2 years
  o 2 years = 4 terms
  o About 120/4 = 30 credits per term
• A course that yields 5 credits requires, for example, a minimum of about 125 hours of work

• Advice in making a PSP in Data Science:
  o Education Coordinator Reijo Sivèn, reijo.siven@helsinki.fi, D239
  o Research Coordinator Pirjo Moen, pirjo.moen@helsinki.fi, D242
PLANNING OF STUDIES (2)

• Only few compulsory courses (35 credits)

• Rest of the courses you need to select
  o to fulfil the degree requirements
  o to support your thesis
  o to be interesting for yourself
PLANNING OF STUDIES (3)

• The basic planning rule:
  o Schedule some 2 hours of independent work per every classroom or exercise hour

• The number of lectures and other contact teaching per course (and credit) varies
  o Uncommonly few teaching hours in relation to the number of credits a course yields => the portion of independent work is even larger than described above
PLANNING OF STUDIES (4)

• Why?
  o Unique experts at graduation
    ▪ Different course selections
    ▪ Own, unique thesis
  o Allows unexpected combinations
  o Students learn to manage their own plans and schedules
IMPORTANT GUIDES AND LINKS

- Instructions for students: http://guide.student.helsinki.fi/en
- My studies: https://student.helsinki.fi/info/login
- Course pages: https://courses.helsinki.fi
- Weboodi: https://weboodi.helsinki.fi
- SIS Tool for making the personal study plan
  - https://sis-helsinki.funidata.fi/
- Web pages of the programme
TEACHING PERIODS 2019-2020

- 4 periods (7 weeks teaching + one exam week)
  - [ Intensive period in August (26.8.-1.9.) ]
  - I Period: September 2 - October 20 (exams: 21.10.-27.10.)
  - [ Intensive period in January (2.1.-12.1.) ]
  - III Period: January 13 - March 1 (exams: 2.3.-8.3.)
  - IV Period: March 9 - May 3 (exams: 4.5.-10.5.)
  - [ Intensive period in May (4.5. – 29.5.) ]
PERIOD 1 IN 2019-2020

• Core courses:
  o Introduction to Data Science
  o Orientation to Data Science Studies
  o Academic Writing 1 (cont. on Period 2; group 4, or groups 3 and 6)

• Elective courses:
  o Introduction to Artificial Intelligence (highly recommended); Introduction to Big Data Management
  o Design and Analysis of Algorithms; Computational Statistics I; Inverse Problems 1: convolution and deconvolution

• Optional courses:
  o Computer Vision (year 2)
PERIOD 2 IN 2019-2020

• Core courses:
  o Distributed Data Infrastructures
  o Introduction to Machine Learning
  o Statistical Data Science
  o Academic Writing 1 (continues from Period 1; group 4, or groups 3 and 6)

• Elective courses:
  o Data Compression Techniques, High Dimensional Statistics

• Optional courses:
  o Trustworthy Machine Learning (year 2)
  o Research Project in Cognitive Science
PERIOD 3 IN 2019-2020

• Core courses:
  o Data Science Project I (continues on Period 4)
  o Data Science Seminar I (continues on Period 4)

• Seminars:
  o Big Data Management
  o Computational Musicology
  o Computer Vision
  o Algorithmic Topic in Computational Biology
  o Machine Learning with Distributed Data
PERIOD 3 IN 2019-2020 (2)

• Elective courses:
  o Network Analysis
  o Cloud and Edge Computing
  o Tools of High Performance Computing

• Optional courses:
  o Deep Learning
  o Introduction to Information Retrieval
  o Multidisciplinary course: Computational Analysis of the Changing World (intensive course a the beginning of the period)
PERIOD 4 IN 2019-2020

• Core courses:
  o Data Science Project I (continues from Period 3)
  o Data Science Seminar I (continues from Period 3)
  o Academic Writing 2 (?)

• Elective courses:
  o Advanced Bayesian Inference
  o Advanced Course in Machine Learning
  o Interactive Data Visualization
  o Tools of High Performance Computing (continues)
INTENSIVE PERIOD IN MAY 2020

- Optional courses:
  - Collaborative Project in Digital Humanities

- Information on other possible courses is not available yet
REGISTRATION FOR COURSES AND EXAMS

• Registration is done in Weboodi

• Registration for lecture courses typically starts 2-4 weeks before the beginning of the period

• Registration for course and separate exams must be done at latest 10 days before the exam

• If you want the separate exam questions in English, contact the examiner two weeks before the exam
MORE INFORMATION
SOURCES OF INFORMATION

• Staff of the programme:
  o data-science-studies@helsinki.fi or
  o In person by e-mail or during office hours
• Tutors and other students in the programme
• Kumpula Student Services:
  o kumpula-student@helsinki.fi
  o Visiting and telephone hours Mon 12-14 and Thu 12-14

• Faculty of Science
  o https://www.helsinki.fi/en/faculty-of-science
KUMPULA STUDENT SERVICES

- Annual registrations
- Changes in address and name
- Transcripts of studies
- Certificates of student status
- Certificates for student travel discounts (Welcome Fair!)
- Degree diplomas
- Advice on
  - enrolment and various study options/rights
  - student benefits
STUDIES ELSEWHERE

• International Exchange Services help in questions related to
  o studies and traineeships abroad
  o flexible study rights (JOO studies)

• More information in Instructions for Students at
  o https://guide.student.helsinki.fi/en/study-abroad
  o https://guide.student.helsinki.fi/en/article/contact-international-exchange-services
QUESTIONS?

COMMENTS?