MA22004 Course Design Plan

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Chapter 1

Teaching-Learning Activities

Wir shaffen das.

Summary: MA22004 will run for 11 weeks (20 SCQF/10 ECTS) requiring approximately 200 hours student effort (or 17.5 hours per week less the examination time). On an average week there will be seven planned teaching and learning activities, detailed below. These include 1 seminar (1 h duration, **timetabled**, **online**), 1 workshop (1 hour duration, **timetabled**, **face-to-face**), and 1 lab (approx. variable duration, **online, asynchronous**). The expectation will be that students access and engage with the lecture notes and curated digital content before participating in the seminar.

1.1 Seminar Reading

This activity contains an engagement measure.

Read Watch Listen	*3 hours*	*1 student*	*Tutor is not available*	*Online*

Read lecture notes.

Collaborate	*1 hour*	*6 students*	*Tutor is not available*	*Online*

(Pre Seminar) Comment on lecture notes through Persuall (measure engagement by fixed number of questions/answers asked).

Investigate	*1 hour*	*1 student*	*Tutor is not available*	*Online*

(Post Seminar) Understand connections between material by exploring comments and questions and through reflection.

1.2 Preparation: Seminar Investigation

Investigate	*1 hour*	*1 student*	*Tutor is not available*	*Online*

Supplementary online material (curated content).

1.3 Seminar

This activity contains both engagement and assessment measures.

Produce	*10 minutes*	*1 student*	*Tutor is available*	*Online*

Seminar quiz (measure attainment based on quiz grade).

Discuss	*40 minutes*	*60 students*	*Tutor is available*	*Online*

Review key points of material with appropriate polling (measure engagement by participation in polling and discussion).

Practice	*10 minutes*	*6 students*	*Tutor is available*	*Online*

Student presentations: either a lab presentation or solutions to the seminar quiz. Students who are not presenting a lab presentation will be expected to provide the presenting group with feedback (through blackboard).

1.4 Computer lab

This activity contains both engagement and assessment measures.

Read Watch Listen	*1 hour and 30 minutes*	*1 student*	*Tutor is not available*	*Online*

Read instructions and examples.

Practice	*2 hours*	*1 student*	*Tutor is not available*	*Online*

Practice coding and respond to simple interactive elements that deliver instant feedback (measure engagement by responding to interactive elements).

Produce	*2 hours*	*1 student*	*Tutor is not available*	*Online*

Answer review questions and submit for evaluation (measure attainment based on answers to review questions).

1.5 Preparation: Workshop

Practice	*2 hours*	*1 student*	*Tutor is not available*	*Online*

Attempt workshop problems.

1.6 Workshop (Face-to-face)

Collaborate	*1 hour*	*6 students*	*Tutor is available*	*F2F*

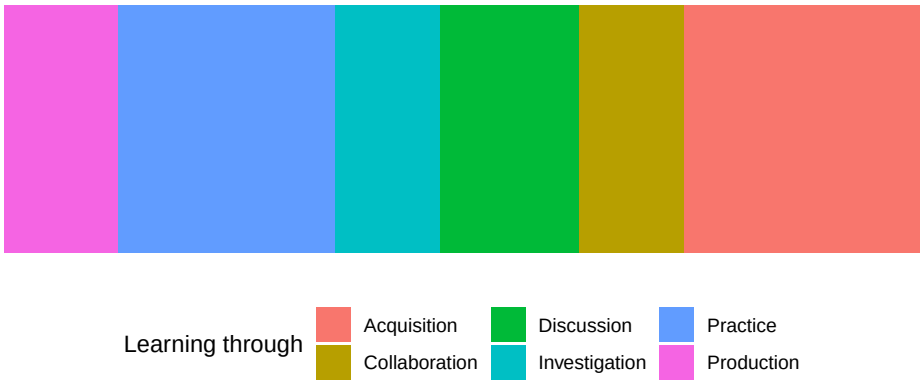
Students discuss problems together in small groups. *This could be done using break-out rooms if face-to-face meeting not possible.*

1.7 Office Hours

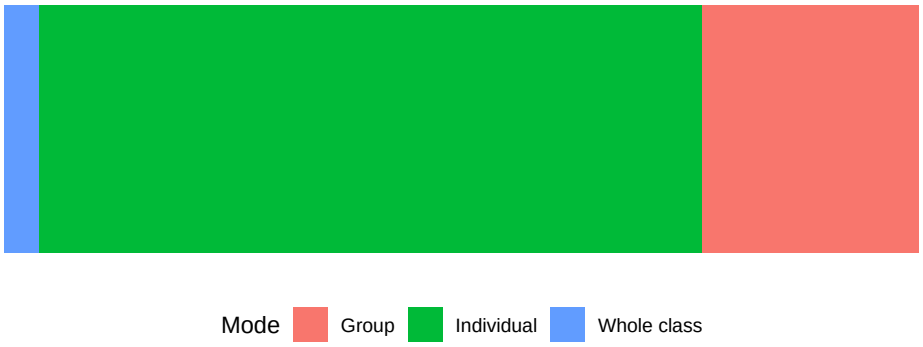
Discuss	*2 hours*	*6 students*	*Tutor is available*	*Online*

Instructor available to answer questions about lab/reading. Typically this will not be one-on-one but small group meetings.

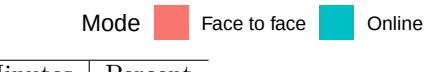
Representations of the learning experience



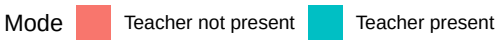
Learning through	Minutes	Percent
Acquisition	270	26
Investigation	120	11
Discussion	160	15
Practice	250	24
Collaboration	120	11
Production	130	12



Mode	Minutes	Percent
Whole class	40	4
Group	250	24
Individual	760	72



Mode	Minutes	Percent
Face to face	60	6
Online	990	94



Mode	Minutes	Percent
Teacher present	240	23
Teacher not present	810	77

Chapter 2

Engagement and Attainment

The active learning categorization for each activity is identified in § Learning.

2.1 Engagement Plan

There are several points that can be measured to assess engagement, including:

- **Seminar Reading** Students will be presented with a new collection of notes weekly using Perusall. Students will be responsible for reading notes posting both questions/comments and responses (collaborative annotation). Student engagement will be tracked in Perusall through quality of discourse.
- **Seminar** During seminars, students will be presented with *live polls*, using either Mentimeter or Itempool, to encourage reflection and discussion. Student engagement will be assessed through participation.
- **Seminar** During seminars, students will take turns *presenting* a lab report or quiz solutions with their workshop groups. This will encourage students to challenge their peer's analysis. Student engagement will be assessed through participation.
- **Computer Lab** Students will be required to *respond* to questions that will be computer-graded in interactive computer labs. Student engagement will be assessed through quality of responses.

2.2 Attainment Plan

Student attainment will be assessed continuously through the evaluation of student produced materials and presentations. These items include: + lab reports, + lab presentation (group), + two midterm examinations (computer graded). The grades of these continuous assessment will offer opportunities for intervention and students will receive The final examination will provide a comprehensive assessment of the whole course.

Chapter 3

Assessment

The module assessment will be weighted:

Assessment	Weight
Assignments	20%
Midterm Exam 1	20%
Midterm Exam 2	20%
Final Exam	40%

Note: This is a modification from the previous split (60% degree exam, 20% two class tests, and 20% coursework). As the students will not be given a revision period, the Final Exam will need to be less cumulative in scope and therefore additional weight will be placed on the Midterm Exams.

3.1 Examinations

The **Midterm Exams** will be computer-assessed and will be 1 hour in scope (compared to the 2 hour Final Exam). These will likely be held in week 4 and week 8.

The **Final Exam** will be a 2 hour hand-written exam. Students will be given one additional hour to scan, code, and upload their manuscripts using Gradescope. This process will be thoroughly discussed and practiced by the students with a dummy exam in advance of a real submission. The Final Exam will be given in the last week of term (i.e., during week 11).

3.2 Assignments

The assessed coursework will include 6 lab reports and 1 lab report presentation (group work).

Chapter 4

NEEDS

Digital needs

1. bringing computer lab into cloud: semester subsription to RStudio Cloud[1] (approx. 1000 USD)
2. polling: mentimeter or itempool

Hardware needs

1. Better microphone
2. Tablet with stylus

[1] A better long-term solution would be to run `RStudio Server Pro` and `RStudio Connect` on in-house server running, licenses are available for free for teaching purposes.

Rmarkdown Example

Math

Here is an example page containing math markdown.

```
We can use inline math, $f_X$, $f_Y$, and $f_{X,Y}$, as well as display math,
\[
  I(X;Y)
  = \iint_{\mathcal{X} \otimes \mathcal{Y}}
  \log\left( \frac{f_{X,Y}(x,y)}{f_{X}(x)f_{Y}(y)} \right)
  f_{X,Y}(x,y) \mathrm{d}y \mathrm{d}x\,.
\]
```

to generate:

We can use inline math, f_X, f_Y, and $f_{X,Y}$, as well as display math,

$$I(X;Y) = \iint_{\mathcal{X} \otimes \mathcal{Y}} \log \left(\frac{f_{X,Y}(x,y)}{f_X(x) f_Y(y)} \right) f_{X,Y}(x,y) \mathrm{d}y \mathrm{d}x\,.$$

Plots

```
x <- seq(-8, 8, length=1000)
y0 <- dnorm(x, -2, 1)
y1 <- dnorm(x, 2, 1)
df <- tibble(x, y0, y1)
df <- melt(df, id.var = "x", value.name = "y")

ggplot(data = df, aes(x = x, color = variable)) + geom_line(aes(y=y))
```

The figure with caption caption is created by typing the code directly into the markdown document:

```
```{r normals-same-var, echo=TRUE, fig.cap="Two normal variates with different means and same var
  x <- seq(-8, 8, length=1000)
  y0 <- dnorm(x, -2, 1)
```
```

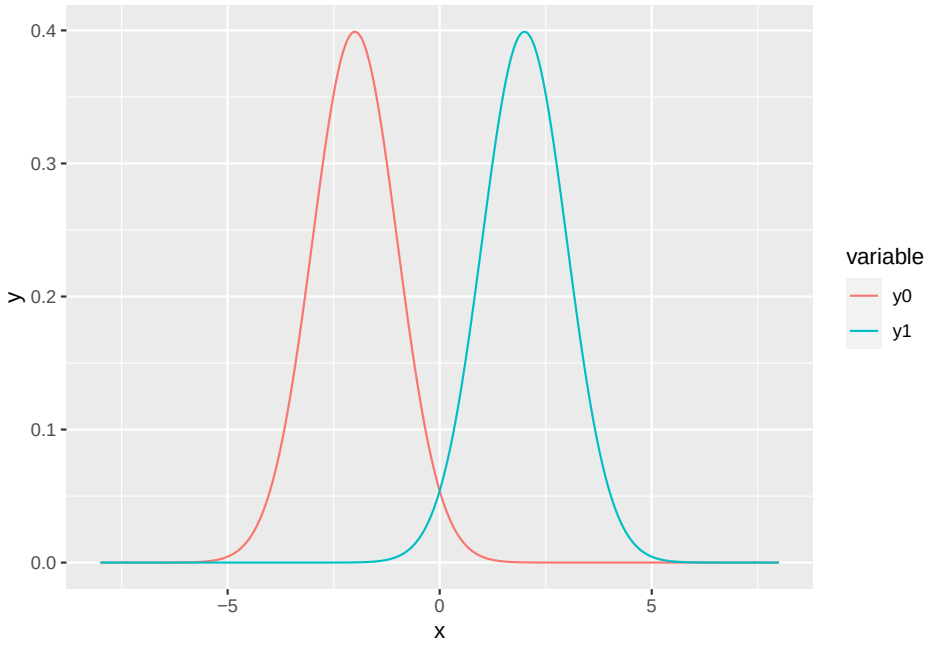


Figure 4.1: Two normal variates with different means and same variance. Note this figure is a scalable vector graphic — from what I understand, this is better from an accessbility standpoint.

```
  y1 <- dnorm(x, 2, 1)
  df <- tibble(x, y0, y1)
  df <- melt(df, id.var = "x", value.name = "y")
  ggplot(data = df, aes(x = x, color = variable)) + geom_line(aes(y=y))
```