Advanced Statistics Unit: Summative Assessment (100% of Unit marks)

Dr Tom Palmer

Key deadlines for your diary (non-negotiable):

Assessment Submission: 12 noon, Wednesday 26th April 2023.

Please submit your electronic copy (Word or pdf) on the Blackboard page submission area.

1. Assessment task

Between July 1984 and December 1989 the German Breast Cancer Study Group recruited 720 patients with primary node positive breast cancer into the Comprehensive Cohort Study (Schmoor, Olschewski, and Schumacher 1996).

In the original study participants were randomized to groups of different numbers of cycles of chemotherapy. There was shown to be no statistical difference between the treatment groups (Schumacher et al. 1994).

You are given the data for the 686 participants with data on recurrence free survival and prognostic factors, which included; age, tumour size, number of positive lymph nodes, progesterone and oestrogen receptor status, menopausal status and tumour grade. These are the following variables in the dataset.

Variable	Description
`id`	ID of study participants
`hormon`	Indicator of hormonal therapy (`0` no, `1` yes)
`age`	Age in years
`menostatus`	Menopausal status (`1` premenopausal, `2` postmenopausal
`tsize`	Tumour size in mm
`tgrade`	Tumour grade ($1 > 2 > 3$)
`posnodes`	The number of positive lymph nodes
`progrec`	Progesterone receptor, fmol
`estrec`	Estrogen receptor, fmol
`rectime`	Recurrence free survival in days
`recyear`	Recurrence free survival in years
`censrec`	Censoring indicator (`0` censored, `1` event)
`x4a`	Indicator of tumour grade ≥ 2
`x4b`	Indicator of tumour grade $= 3$
`x5e`	Transformation of number of positive nodes, $\exp(-0.12 \times$ `posnodes`$)$

The dataset is in the file *assessment.rds*. Read it into R using

```
dat <- readRDS("assessment.rds")
```

The aim of the study is to fit a prognostic time to event model assessing the effect of various variables in the study on recurrence free survival time.

You are told that the treatment variable, `hormon`, indicating hormonal therapy should be considered in your model.

Justify your choice of model in the following ways

- Investigate the presence of missing data in the dataset and consider whether to use a method that accounts for missing data.
- Justify the covariates you choose to include in your prognostic model.
- Consider the different types of time to event models that we have covered in Unit and justify the one that you choose.

Please write a report following the IMRAD (Introduction, Methods, Results, and Discussion) structure. The report will include an introduction to the research question, a description of the analysis carried out, appropriate presentation of relevant results, a discussion and references.

Please include a short (200 word) abstract.

You may use any of the methods covered in the lectures to estimate the relationship of interest. Please justify your choice of method. A mathematical presentation of the model/s estimated should be included in your report.

Please include an appendix of your R code.

2. Intended learning outcomes

This assessment covers the learning outcomes of the Unit as detailed here.

3. Good academic Practice

This is a piece of coursework that contributes to your Unit mark and you can:

- Use resources to support you in completing your answer.
- Draw upon a range of accepted resources including, your own notes, lecture slides/recordings, course material, textbooks, journal articles, online resources. ALL work should be written in your own words.
- Ask for help from your personal tutors or academic lecturers if you do not understand an aspect of the coursework.
- Broad discussion with your tutors, fellow students, friends and family on the assessment topic and your ideas/approach may help you to further your knowledge and understanding.
- Use your network of family and friends to gain support and encouragement during the assessment period.

Please remember this is a formal assessment and you should behave in a manner consistent with our values. This means you cannot:

- Allow others to directly contribute to your written answer by revising or adding to the academic content. This is collusion and is against University Regulations.
- Share your assessment with others or ask others to share their work with you.
- Copy and paste any material (text, images, coding, calculations) from other sources, including teaching material and shared revision notes directly into your answer without appropriate acknowledgement. This is plagiarism (see section 5)
- Pay another person or company to complete the assessment for you. This is contract cheating and is against University Regulations.

4. Assessment submission

Assessment should be submitted via Blackboard by 12 noon Wednesday 26th April 2023. Please give your submission a filename: [assessment name]_[your student number] e.g. POSTER_01234.

Submissions should be in Word or pdf, using 11 or 12 pt font.

Failure to submit on time will incur penalties unless you have an approved extension. Please see the Programme Handbook on Blackboard for details on the extension and extenuating circumstances procedure, and for the penalties for late submission of coursework. If you encounter problems with your submission, or if you are likely to have a problem submitting on time, please email the course administrator as soon as possible brms-msdscourseadmin@bristol.ac.uk.

5. Marking

Marks will be assigned following the marking scale in the programme handbook.

The weighting of marks will be broken down by the following sections

- Content [95%]:
  - Introduction [10%]
  - Methods [30%]
    - Choice and justification of an appropriate method
  - Results [30%]
    - Obtaining relevant estimates
    - Accurate interpretation of results
  - Discussion [25%]
- Presentation and referencing [5%]:
  - Accurate spelling and referencing throughout
  - Adhering to assessment instructions
  - Clear and logical structure

6. Referencing, Copyright and intellectual property

You need to include references in your coursework.

It is important that the coursework you submit is your own work. All written assessments will be checked by Turnitin for issues related to plagiarism, collusion, and cheating. Please see the Programme Handbook for important information on academic integrity. You are also able to re-listen to the course Welcome Week academic integrity talk at any time or view the guidance on the University's website https://www.bristol.ac.uk/students/support/academic-advice/academic-integrity/.

Copyright and intellectual property rights are also important issues to be aware of when using the work of others in your coursework. This is not just about ensuring that you correctly reference everything, but you also need to be sure that you have permission to re-use this work. Examples of this might be displaying a figure you have taken from someone else's work or using an existing questionnaire. If you have any concerns about copyright issues, please speak to the unit lead in advance of submitting your assessment.

You may include photographs or scans of your own hand-drawn, labelled diagrams or calculations. We would advise you to generate your own diagrams but if you include diagrams or pictures that you have not produced yourself, or are modified versions of existing images, you should ensure you reference them appropriately.

7. Wordcount

The word limit for this assessment is 2,500 words. This includes:

- All text including in-text titles and headings
- All in-text citations
- Figure and Table Legends

The word limit does not include:

- Cover sheet
- Title Page
- Contents page(s)
- List of abbreviations/nomenclature
- Acknowledgements
- Abstract(s)
- List of references
- Text in tables
- Text in figures
- Index
- Footnotes
- Appendix

Exceeding the word limit will incur the following penalties. You will be informed of any penalties applied to your assessment:

Coursework that exceeds the stated word limit by:	Penalty (absolute):
Up to 5%	5 marks from 100 are deducted*
Between 6-10%	10 marks from 100 are deducted*
Between 11% and 20%	20 marks from 100 are deducted*
Between 21% and 50%	50 marks from 100 are deducted*
By over 50%	A mark of 0 is awarded

* Note: the minimum mark is 0, negative marks will not be given.

Please see the Programme Handbook for further information on wordcount limits and penalties.

References

Schmoor, C., M. Olschewski, and M. Schumacher. 1996. "Randomized and Non-Randomized Patients in Clinical Trials: Experiences with Comprehensive Cohort Studies." *Statistics in Medicine* 15 (3): 263–71. https://doi.org/10.1002/(SICI)1097-0258(19960215)15:3%3C263::AID-SIM165%3E3.0.CO;2-K.

Schumacher, M, G Bastert, H Bojar, K Hübner, M Olschewski, W Sauerbrei, C Schmoor, C Beyerle, R L Neumann, and H F Rauschecker. 1994. "Randomized 2 × 2 Trial Evaluating Hormonal Treatment and the Duration of Chemotherapy in Node-Positive Breast Cancer Patients. German Breast Cancer Study Group." *Journal of Clinical Oncology* 12 (10): 2086–93. https://doi.org/10.1200/JCO.1994.12.10.2086.