<table>
<thead>
<tr>
<th>MONDAY</th>
<th>Session</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30-9:00</td>
<td><strong>Session</strong> 0</td>
<td>Registration (tea and coffee will be available)</td>
</tr>
<tr>
<td>9:00-9:45</td>
<td><strong>Introduction and logistics</strong></td>
<td>Michel Coleman</td>
</tr>
<tr>
<td>09:45-10:15</td>
<td><strong>Cancer survival research and cancer policy - 1</strong></td>
<td>Michel Coleman</td>
</tr>
<tr>
<td>10:15-11:00</td>
<td><strong>Population-based measures of cancer burden</strong></td>
<td>Libby Ellis</td>
</tr>
<tr>
<td>11:00-11:30</td>
<td>Morning coffee</td>
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</tr>
<tr>
<td>11:30-12:30</td>
<td><strong>Introduction to survival analysis</strong></td>
<td>Ula Nur</td>
</tr>
<tr>
<td>12:30-13:30</td>
<td>Welcome lunch in South Courtyard</td>
<td></td>
</tr>
<tr>
<td>13:30-15:00</td>
<td><strong>Population-based cancer survival: concepts and estimation 1</strong></td>
<td>Bernard Rachet</td>
</tr>
<tr>
<td>15:00-15:30</td>
<td>Afternoon tea</td>
<td></td>
</tr>
<tr>
<td>15:30-16:00</td>
<td><strong>Population-based cancer survival: concepts and estimation 2</strong></td>
<td>Bernard Rachet</td>
</tr>
<tr>
<td>16:00-16:30</td>
<td><strong>Practical 1: Introduction</strong></td>
<td>Student groups with faculty</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>TUESDAY</th>
<th>Session</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30-9:00</td>
<td><strong>Questions and Answers from Day 1</strong></td>
<td>All students and faculty</td>
</tr>
<tr>
<td>9:00-10:00</td>
<td><strong>Population-based cancer survival: data quality and quality control</strong></td>
<td>Claudia Allemani</td>
</tr>
<tr>
<td>10:00-11:00</td>
<td><strong>Age standardisation of cancer survival</strong></td>
<td>Manuela Quaresma</td>
</tr>
<tr>
<td>11:00-11:30</td>
<td>Morning Coffee</td>
<td></td>
</tr>
<tr>
<td>11:30-13:00</td>
<td><strong>Practical 2: Estimating cancer survival</strong></td>
<td>Student groups with faculty</td>
</tr>
<tr>
<td>13:00-14:00</td>
<td>Lunch break</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>Session</td>
<td>Activity</td>
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</tr>
<tr>
<td>14:00-15:00</td>
<td>Session 11</td>
<td><strong>Impact of using different life tables on cancer survival</strong>&lt;br&gt;Camille Maringe</td>
</tr>
<tr>
<td>15:00-15:30</td>
<td></td>
<td>Afternoon Tea</td>
</tr>
<tr>
<td>15:30-17:00</td>
<td>Session 12</td>
<td><strong>Practical 3: Impact of using different life tables on cancer survival</strong>&lt;br&gt;Student groups with faculty</td>
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</tbody>
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**WEDNESDAY**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:30-9:00</td>
<td>Session 13</td>
<td><strong>Questions and Answers from Day 2</strong>&lt;br&gt;All students and faculty</td>
</tr>
<tr>
<td>9:00-10:00</td>
<td>Session 14</td>
<td><strong>Period analysis and “prediction” of survival</strong>&lt;br&gt;Bernard Rachet</td>
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<tr>
<td>10:00-10:30</td>
<td></td>
<td>Morning Coffee</td>
</tr>
<tr>
<td>10:30-12:00</td>
<td>Session 15</td>
<td><strong>Practical 4: Period analysis and “prediction” of survival</strong>&lt;br&gt;Student groups with faculty</td>
</tr>
<tr>
<td>12:00-13:00</td>
<td></td>
<td>Lunch break</td>
</tr>
<tr>
<td>13:00-14:30</td>
<td>Session 16</td>
<td><strong>Modelling net survival</strong>&lt;br&gt;Paul Dickman</td>
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<tr>
<td>14:30-15:15</td>
<td></td>
<td>Course photograph (front steps) followed by tea break</td>
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<tr>
<td>15:15-17:00</td>
<td>Session 17</td>
<td><strong>Practical 5: Modelling net survival</strong>&lt;br&gt;Student groups and faculty</td>
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**THURSDAY**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30-9:00</td>
<td>Session 18</td>
<td><strong>Questions and Answers from Day 3</strong>&lt;br&gt;All students and faculty</td>
</tr>
<tr>
<td>9:00-10:00</td>
<td>Session 19</td>
<td><strong>History of Ederer I, II, Hakulinen, net survival</strong>&lt;br&gt;Paul Dickman</td>
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<td>10:00-10:30</td>
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<td>Morning Coffee</td>
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<tr>
<td>10:30-12:00</td>
<td>Session 20</td>
<td><strong>Crude probability of death: estimation and applications</strong>&lt;br&gt;Paul Dickman</td>
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<tr>
<td>12:00-13:00</td>
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<td>Lunch break</td>
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<tr>
<td>13:00-14:30</td>
<td>Session 21</td>
<td><strong>Missing data and the estimation of cancer survival</strong>&lt;br&gt;Ula Nur and Milena Falcaro</td>
</tr>
</tbody>
</table>
14:30-15:00  Afternoon Tea

15:00-16:30  Session 22  **Practical 6: Handling missing data in survival analysis**
Student groups and faculty

16:30-17:30  Session 23  **Cancer survival “clinic” and selected presentations from course participants**
All students and faculty

<table>
<thead>
<tr>
<th>FRIDAY</th>
<th>Session</th>
<th>Activity</th>
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<tbody>
<tr>
<td>8:30-9:00</td>
<td>Session 24</td>
<td><strong>Questions and Answers from Day 4</strong></td>
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<td>All students and faculty</td>
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<tr>
<td>9:00-10:00</td>
<td>Session 25</td>
<td><strong>Data visualisation: funnel plots and mapping for cancer survival</strong></td>
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<td></td>
<td>Manuela Quaresma</td>
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<tr>
<td>10:00-11:00</td>
<td>Session 26</td>
<td><strong>Secondary measures of cancer survival</strong></td>
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<td></td>
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<td>Manar Abdel-Rahman</td>
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<tr>
<td>11:00-11:30</td>
<td></td>
<td>Morning Coffee</td>
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<tr>
<td>11:30-12:30</td>
<td>Session 27</td>
<td><strong>International comparisons of cancer survival</strong></td>
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<td></td>
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<td>Claudia Allemani</td>
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<tr>
<td>12:30-13:30</td>
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<td>Lunch in South Courtyard</td>
</tr>
<tr>
<td>13:30-14:30</td>
<td>Session 28</td>
<td><strong>Cancer survival estimation in low- and middle-income countries (LMIC)</strong></td>
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<td></td>
<td>Rajaraman Swaminathan</td>
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<tr>
<td>14:30-15:30</td>
<td>Session 29</td>
<td><strong>Cancer survival research and cancer policy - 2</strong></td>
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<td></td>
<td>Michel Coleman</td>
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<tr>
<td>15:30-16:00</td>
<td>Session 30</td>
<td><strong>Tools for survival analyses</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>All students and faculty</td>
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</tbody>
</table>

Notes on locations:
All sessions will take place in the School’s Keppel Street site. All lectures take place in the Manson Lecture Theatre. The registration session on the first day will take place on the ground floor outside the Manson Lecture Theatre. Practical sessions will take place in computer rooms located on the 3rd floor (room numbers will be advised). Lunch on Monday 24 and Friday 28 June will take place in the Refectory Open Space, on the lower ground floor of the South Courtyard, as well as tea, coffee and water which will be available at each morning and afternoon break, at the times indicated in the programme.
Outline of contents of each session

Session 0
Introduction and logistics
- Objectives of course
- Introduction of faculty members
- Introduction of course participants
- Outline of course structure
- Presentation of course materials
- Announcements

Session 1
Cancer survival research and cancer policy - 1
- An introduction to the wider public, public health and health policy applications of cancer survival
- Audit of cancer treatment and cancer survival in the population setting
- Impact on survival of implementing cancer treatment guidelines
- Evaluation of cancer control policy

Session 2
Population-based measures of cancer burden
- Principles of population-based measures of cancer burden: incidence, mortality and survival
- Population-based cancer registry data for incidence and survival
- Approaches to the assessment of progress in cancer control
- Relationship between measures of cancer burden

Session 3
Introduction to survival analysis
- Introduction to time-to-event data
- Definition of the survival and hazard functions
- Actuarial and Kaplan-Meier methods for estimation of the survival function
- The Cox proportional hazard model
- Poisson regression

Sessions 4 and 5
Population-based cancer survival: concepts and estimation
- Study designs: cause-specific versus relative survival
- Concepts of observed and net survival, excess hazard of death, and crude probability of death
- Ederer-I, Ederer-II, and Hakulinen estimators
- Informative censoring bias
- Pohar-Perme estimator
Session 6
Practical 1 – Introduction

• This session will include an introduction to Stata and setting up for practicals 2-6
• The session will be led by one of the faculty members and assistant teachers will be available

Session 7
Questions and Answers from Day 1

• An informal question-and-answer session on any topic covered on the first day. All students and faculty will be invited to participate

Session 8
Population-based cancer survival: data quality and quality control

• Background to population-based cancer registration: regional and national registries, general and specialised registries
• Registration systems: sources of data, active and passive follow-up
• Data quality indicators for survival
• Purpose of quality controls:
  o to ensure robust comparisons of survival
  o to document data quality for external review
• Types of quality controls:
  o on variables (compliance with a study protocol)
  o on records (logical coherence)
  o on data sets (frequency distributions, summary measures,...)
• Improving comparability through standard coding approaches to topography, morphology and stage

Session 9
Age Standardisation of cancer survival

• Importance of age standardisation for comparing survival between different populations
• Methods for age-standardisation
• Choice of standard cancer population weights
• Extension to multi-factor adjustment
• Examples of application

Session 10
Practical 2 – Estimating cancer survival

• Students will be divided into small groups for a practical analysis using real data, in one of the LSHTM computing rooms
• The session will be led by one of the faculty members and assistant teachers will be available
Session 11
Impact of using different life tables on cancer survival

- Life tables as a cross-sectional summary of recent mortality
- Data required for constructing a life table
- Role of life tables in relative survival analysis
- Utility of life tables for population sub-groups in relative survival analysis
- Complete and abridged life tables
- Three methods of smoothing abridged life tables to generate complete life tables

Back

Session 12
Practical 3 - Impact of using different life tables on cancer survival

- Students will be divided into small groups for a practical analysis using real data, in one of the LSHTM computing rooms
- The session will be led by one of the faculty members and assistant teachers will be available

Back

Session 13
Questions and Answers from Day 2

- An informal question-and-answer session on any topic covered on the second day. All students and faculty will be invited to participate

Back

Session 14
Period analysis and “prediction” of survival

- Cohort, complete and period approaches to cancer survival analysis
- Principles and theoretical basis of period analysis: analogy with expectation of life
- Application and interpretation of period survival estimates
- Developments in period analysis, including hybrid analysis

Back

Session 15
Practical 4 – Period analysis and “prediction” of survival

- Students will be divided into small groups for a practical analysis using real data, in one of the LSHTM computing rooms
- The session will be led by one of the faculty members and assistant teachers will be available

Back

Session 16
Modelling net survival

- Outcome in survival analysis can be expressed as either a survival proportion or mortality rate (hazard)
- Net mortality can be estimated and modelled in a cause-specific or relative survival framework. We model on the hazard scale; cause-specific or excess.
- Three modelling approaches will be presented; Cox regression, Poisson regression, and flexible parametric models. The latter two can be used to model both cause-specific and excess mortality whereas the other two can model both
- The three approaches are conceptually very similar
- The proportional hazards assumption
Session 17
Practical 5 – modelling net survival

- Students will be divided into small groups for a practical analysis using real data, in one of the LSHTM computing rooms
- Teaching faculty members and all assistant teachers will be available

Session 18
Questions and Answers from Day 3

- An informal question-and-answer session on any topic covered on the third day. All students and faculty will be invited to participate

Session 19
History of Ederer I, II, Hakulinen, net survival

- Recap from sessions 16 and 17 on estimators of relative and net survival.
- Philosophy behind the estimators. Why they were developed and how recommendations have changed over time.
- Which estimator should one use in practice?

Session 20
Crude probability of death: estimation and applications

- Net survival (i.e., cause-specific survival) is estimated for a hypothetical world where one cannot die of causes other than the cancer of interest
- One can also estimate so-called crude probabilities, which represent the probability of dying of a specific cancer in the real world
- Estimating crude probabilities in a life table framework; implemented in -strs-
- Estimating crude & net mortality using individual data
- In which world should we work (real or hypothetical)?
- Application: Quantifying differences in breast cancer survival between England and Norway
- Application: Survival of patients with Hodgkin's lymphoma
- Demonstration: Estimating crude probabilities using Stata

Session 21
Missing data and the estimation of cancer survival

- Missing data, a recurrent problem: not to be ignored!
- Missing data mechanisms
- Methods for handling missing data
- Multiple imputation
- Modelling of relative survival in the presence of incomplete data
Session 22
Practical 6 – Handling missing data in survival analysis

- Students will be divided into small groups for a practical analysis using real data, in one of the LSHTM computing rooms
- Teaching faculty members and all assistant teachers will be available

Session 23
Cancer survival “clinic” and selected presentations from course participants

This session is dedicated to discussion of any practical research problem encountered by participants. All participants are invited to offer a short presentation focussed on cancer survival, for discussion at this session. The presentation could be based on analysis of the participant’s own data, but could also be used to raise a theoretical or applied question about cancer survival – this may include issues in statistics, computing, data quality, public health or health policy. If many presentations are offered, faculty members will select a few presentations that can be made during this session.

Session 24
Questions and Answers from Day 4

- An informal question-and-answer session on any topic covered on the fourth day. All students and faculty will be invited to participate

Session 25
Data visualisation: funnel plots and mapping for cancer survival

- User needs and demands for data
- Performance indicators and interpretation of ranked results
- Principles of funnel plots for institutional comparison
- Application of funnel plots to explore regional and temporal variations in cancer survival and related measures
- Principles of mapping cancer survival
- Mapping temporal change and the impact of policy changes on survival

Session 26
Secondary measures of cancer survival

- ‘Avoidable deaths’ and ‘cure’, two examples of secondary measures of cancer survival
- The concepts of ‘avoidable deaths’ and ‘cure’ in the context of relative survival and excess mortality
- Application and interpretation:
  - Avoidable deaths: international disparities, time trends, socio-economic inequalities
  - ‘Cure’ parameters: role of age and stage in time trends
Session 27

International comparisons of cancer survival

- EUROCARE, CONCORD and other international collaborative studies
- Importance of age standardisation
- "Low-resolution", "high-resolution" and "patterns of care" studies
- Impact of data quality and bias on the interpretation of international differences in survival
- The issue of national representativeness

Session 28

Cancer survival estimation in low- and middle-income countries (LMIC)

- Cancer survival studies in LMIC - not always possible with routine data; require special efforts; SurvCan project (IARC)
- Complete follow-up - inadequate mortality ascertainment by passive method; active methods to be evolved for correct vital status
- Methods of survival estimation - distinguishing losses from technical censoring; non-random censoring; loss-adjusted survival
- Differential cancer survival statistics in LMIC - systematic evaluation of bias due to methods; suitable corrections for survival estimates; interpreting survival differences
- A standard template for cancer survival studies in LMIC

Session 29

Cancer survival research and cancer policy - 2

- Are cancer survival statistics of any use for public health and health policy?
- Confidentiality and consent in cancer registration
- Public health and policy impact of ethnic, socio-economic and international comparisons of cancer survival
- World Cancer Declaration 2008 and WHO policy on non-communicable diseases

Session 30

Tools for relative survival

- Availability and compatibility of software packages for the estimation of cancer survival STNS, SURV3, RELSURV, STREL, SEER*Stat, STRS, ... in Stata, SAS or R
- Implementation of survival analysis packages in public-use databases such as SEER*Stat (USA) and the Cancer Information System (UK)
- Availability of life tables and other tools for survival analysis
- Residual questions about theoretical issues covered during the course

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