## MONDAY

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30-9:00</td>
<td></td>
<td>Registration (tea and coffee will be available)</td>
</tr>
<tr>
<td>9:00-9:45</td>
<td></td>
<td><strong>Introduction and logistics</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Michel Coleman</td>
</tr>
<tr>
<td>09:45-10:15</td>
<td><strong>Session 1</strong></td>
<td><strong>Cancer survival research and cancer policy - 1</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Michel Coleman</td>
</tr>
<tr>
<td>10:15-10:45</td>
<td></td>
<td>Morning Coffee</td>
</tr>
<tr>
<td>10:45-12:15</td>
<td><strong>Session 2</strong></td>
<td><strong>Survival and other population-based measures of cancer burden</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Manuela Quaresma</td>
</tr>
<tr>
<td>12:15-13:15</td>
<td></td>
<td>Welcome lunch in South Courtyard</td>
</tr>
<tr>
<td>13:15-14:45</td>
<td><strong>Session 3</strong></td>
<td><strong>Estimating cancer survival</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ula Nur and Bernard Rachet</td>
</tr>
<tr>
<td>14:45-15:30</td>
<td></td>
<td>Course photograph followed by tea break</td>
</tr>
<tr>
<td>15:30-16:00</td>
<td><strong>Session 4</strong></td>
<td><strong>Practical 0: Introduction</strong></td>
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<tr>
<td></td>
<td></td>
<td>Student groups with faculty</td>
</tr>
<tr>
<td>16:00-17:30</td>
<td><strong>Session 5</strong></td>
<td><strong>Practical 1: Estimating cancer survival</strong></td>
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<tr>
<td></td>
<td></td>
<td>Student groups with faculty</td>
</tr>
</tbody>
</table>

## TUESDAY

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30-9:00</td>
<td><strong>Session 6</strong></td>
<td><strong>Questions and Answers from Day 1</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>All students and faculty</td>
</tr>
<tr>
<td>9:00-10:00</td>
<td><strong>Session 7</strong></td>
<td><strong>Net Survival</strong></td>
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<tr>
<td></td>
<td></td>
<td>Bernard Rachet</td>
</tr>
<tr>
<td>9:00-10:00</td>
<td></td>
<td>Morning Coffee</td>
</tr>
<tr>
<td>10:00-10:30</td>
<td></td>
<td>Morning Coffee</td>
</tr>
<tr>
<td>10:30-12:00</td>
<td><strong>Session 8</strong></td>
<td><strong>Life tables for cancer survival analysis</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Laura Woods and Camille Maringe</td>
</tr>
<tr>
<td>12:00-13:00</td>
<td></td>
<td>Lunch break</td>
</tr>
<tr>
<td>13:00-14:30</td>
<td><strong>Session 9</strong></td>
<td><strong>Practical 2 – Generating life tables and the impact of differences in background mortality</strong></td>
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<tr>
<td></td>
<td></td>
<td>Student groups with faculty</td>
</tr>
<tr>
<td>14:30-15:00</td>
<td></td>
<td>Afternoon Tea</td>
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<tr>
<td>15:00-16:30</td>
<td><strong>Session 10</strong></td>
<td><strong>Period analysis and “prediction” of survival</strong></td>
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<tr>
<td></td>
<td></td>
<td>Bernard Rachet</td>
</tr>
<tr>
<td>Time</td>
<td>Session</td>
<td>Title</td>
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</tr>
<tr>
<td>Wed 08:30-9:00</td>
<td>Session 11</td>
<td>Questions and Answers from Day 2</td>
</tr>
<tr>
<td>09:00-10:00</td>
<td>Session 12</td>
<td>Modelling cause-specific mortality (cause-specific survival)</td>
</tr>
<tr>
<td>10:00-10:30</td>
<td>Morning Coffee</td>
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<tr>
<td>10:30-12:00</td>
<td>Session 13</td>
<td>Modelling excess mortality (relative survival)</td>
</tr>
<tr>
<td>12:00-13:00</td>
<td>Lunch break</td>
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<tr>
<td>13:00-14:30</td>
<td>Session 14</td>
<td>Practical 3 – Modelling - 1</td>
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<tr>
<td>14:30-15:00</td>
<td>Afternoon Tea</td>
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<tr>
<td>15:00-16:30</td>
<td>Session 15</td>
<td>Practical 4 – Modelling - 2</td>
</tr>
<tr>
<td>Thu 08:30-9:00</td>
<td>Session 16</td>
<td>Questions and Answers from Day 3</td>
</tr>
<tr>
<td>09:00-10:00</td>
<td>Session 17</td>
<td>Estimating “cure” from cancer</td>
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<tr>
<td>10:00-10:30</td>
<td>Morning Coffee</td>
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<tr>
<td>10:30-12:00</td>
<td>Session 18</td>
<td>Practical 5 – Estimating “cure” from cancer</td>
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<tr>
<td>12:00-13:00</td>
<td>Lunch break</td>
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<tr>
<td>13:00-14:30</td>
<td>Session 19</td>
<td>Missing data and the estimation of cancer survival</td>
</tr>
<tr>
<td>14:30-15:00</td>
<td>Afternoon Tea</td>
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<tr>
<td>15:00-16:30</td>
<td>Session 20</td>
<td>Practical 6 – Handling missing data in survival analysis</td>
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<tr>
<td>16:30-17:30</td>
<td>Session 21</td>
<td>Cancer survival “clinic” and selected presentations from course participants</td>
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### FRIDAY

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Presenter(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30-9:00</td>
<td>Session 22</td>
<td>Questions and Answers from Day 4</td>
<td>All students and faculty</td>
</tr>
<tr>
<td>9:00-9:30</td>
<td>Session 23</td>
<td>Age standardisation of cancer survival</td>
<td>Manuela Quaresma</td>
</tr>
<tr>
<td>9:30-10:00</td>
<td>Session 24</td>
<td>Funnel plots for cancer survival and related measures</td>
<td>Manuela Quaresma</td>
</tr>
<tr>
<td>10:00-10:30</td>
<td>Session 25</td>
<td>Adjustment of relative survival for age and stage</td>
<td>Yuri Ito</td>
</tr>
<tr>
<td>10:30-11:00</td>
<td></td>
<td>Morning Coffee</td>
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</tr>
<tr>
<td>11:00-11:30</td>
<td>Session 26</td>
<td>Avoidable premature deaths</td>
<td>Manar Abdel-Rahman</td>
</tr>
<tr>
<td>11:30-12:30</td>
<td>Session 27</td>
<td>Synergy between incidence, mortality and survival and joint interpretation of their trends</td>
<td>Freddie Bray</td>
</tr>
<tr>
<td>12:30-13:30</td>
<td></td>
<td>Lunch in South Courtyard</td>
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<tr>
<td>13:30-14:30</td>
<td>Session 28</td>
<td>International comparisons of cancer survival</td>
<td>Claudia Allemani</td>
</tr>
<tr>
<td>14:30-15:30</td>
<td>Session 29</td>
<td>Cancer survival research and cancer policy - 2</td>
<td>Michel Coleman</td>
</tr>
<tr>
<td>15:30-16:00</td>
<td>Session 30</td>
<td>Tools for relative survival</td>
<td>All students and faculty</td>
</tr>
</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 lower ground floor (room numbers will be advised). Lunch on Monday 25 and Friday 29 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

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
Survival and other 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
- Follow-up: date of last contact and date of death – active and passive follow-up
- Data quality indicators for survival
- Relationship between measures of cancer burden
- Illustrations

Session 3
Estimating cancer survival

- 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 hazards model
- Definition of all-cause and net survival
- The principles of cause-specific and relative survival
- Approaches to the estimation of relative survival

Session 4
Practical 0 – Introduction

- This session will include an introduction to Stata and setting up for practicals 1-6
- The session will be led by one of the faculty members and assistant teachers will be available
Session 5
Practical 1 – 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 6
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 7
Net survival

- Net survival concept
- Competing risks and relative survival
- Biased estimation of net survival
- Pohar estimator

Session 8
Life tables for cancer survival analysis

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

Session 9
Practical 2 – Generating life tables and the impact of differences in background mortality

- 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 10
Period and hybrid analysis, and “prediction” of survival

- Cohort, complete and period approaches to relative 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
Session 11
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

Session 12
Modelling cause-specific mortality (cause-specific survival)

- Introduction to the basic framework for modelling time-to-event data (survival data)
- Outcome for time-to-event (death) data: either the survival proportion or the mortality rate (hazard), which can be modelled
- Adjusting for ‘time’ in a statistical model and the various ways in which ‘time’ can be defined
- Similarity of the Cox proportional hazards, Poisson regression model, and flexible parametric model for cause-specific mortality
- Applicability of Poisson regression and flexible parametric model (but not Cox model) for modelling relative survival

Session 13
Modelling excess mortality (relative survival)

- Poisson regression to model excess mortality (relative survival)
- Modelling the baseline hazard with flexible smooth functions in Poisson regression
- Flexible parametric model for excess mortality (relative survival)
- Interpretation of the estimates
- The proportional hazards assumption
- How to adjust for non-proportional hazards (it’s just effect modification by time)

Session 14
Practical 3 – Modelling - 1

- 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 15
Practical 4 – Modelling - 2

- 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 16
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 17
Estimating “cure” from cancer

- “Cure” in a population-based context
- Theoretical basis for the statistical estimation of “cure”
- Mixture and “non-mixture” models for estimating “cure”
- Choice of the parametric distribution in “cure” models
- Software for implementing “cure” models
- “Up-to-date” estimates of “cure” derived from period analysis
- Public health applications of estimates of “cure”

Session 18
Practical 5 - Estimating “cure” from cancer

- 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 19
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 20
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 21
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 22
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 23
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 24
Funnel plots for cancer survival and related measures

- User needs and demands for data
- Performance indicators and interpretation of ranked results
- Principles of funnel plots for institutional comparisons
- Application of funnel plots to explore regional and temporal variations in cancer survival and related measures

Session 25
Adjustment of relative survival for age and stage

- Comparing relative survival in patient groups with different age and stage structure

Session 26
Avoidable premature deaths

- Definition of ‘avoidable’ and ‘premature’ deaths in the context of relative survival and excess mortality
- Geographic differences, time trends and socio-economic inequalities in avoidable deaths
- Methodologic approach to estimating avoidable deaths
- Differences in survival presented on a scale of mortality – interpretation and impact

Session 27
Synergy between incidence, mortality and survival and joint interpretation of their trends

- Description currently not available.
Session 28

International comparisons of cancer survival

- EUROCASE, CONCORD and other studies
- Rationale for 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 29

Cancer survival research and cancer policy - 2

- Confidentiality and consent in cancer registration
- Are cancer survival statistics of any use for public health and health policy?
- 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
- What now after the UN High-Level Meeting in 2011 on non-communicable diseases?

Session 30

Tools for relative survival

- Availability and compatibility of software packages for the estimation of relative survival – SURV3, RELSURV, *strel*, SEER*Stat, STRS, ... in Stata or SAS
- 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