

MSc in Epidemiology & Applied BioStatistics
Tumaini College, KCMC
2 year course starting October 2013

Course organiser: Jenny Renju (Dept of Epi and Biostatistics, KCMU College).

This is a 2 year course, leading to a Masters qualification, is designed to cover the basic concepts of epidemiology and many advanced techniques in Biostatistics. The successful graduate will be prepared for a job in research, or in an academic institution. There is a shortage of trained BioStatisticians in East Africa, and this course is designed to help train personnel to fill that gap. Much of the course material for the MSc and Epidemiology and Applied Biostatistics has been adapted from courses run in LSHTM, and some modules are delivered by lecturers from LSHTM

Applicants must have a first degree in medicine, or statistics, with a good knowledge of science, and scientific research. The course is open to all nationalities on an equal basis, without discrimination on sex, age or religion. International applications are welcome.

Course overview. This course will be taught over 2 years.

The first component (approx 9 weeks in 2013) will be a **Foundation course** covering core concepts in Epidemiology, Biostatistics, Research Methods. This course is aimed at new Masters level students who have little (or no) previous training in research, epidemiology, or biostatistics. The Foundation course is compulsory for **all** Masters level students studying in KCMU College, and is recommended for PhD students as a start to their studies prior to defining their research. The course is open to students from other institutions in East Africa, and the materials can be made available to be delivered in other places. The Foundation course, has links and shared materials with the annual NIMR research methods course in Mwanza.

All EAB students will be introduced to various **computer packages**, including Epi-Info, Access, Stata and R. Epi-Info is taught as an integral part of the Foundation course. The introduction to Access and Stata are conducted over a one week duration, and the R course takes 2 weeks.

The two months (January and February) is devoted to **epidemiological concepts**, including modules in Advanced study designs, Epidemiology of Communicable and Non-Communicable diseases, Bioethics and GCP, Monitoring and evaluation, Surveillance and Screening Diagnostics. These modules are practically explanation of epidemiology required by researchers and medical personnel, and some of these will be available as short courses.

The second term (March to May) starts with **standard statistical techniques** (linear regression, logistic regression, Poisson regression). These modules will include lectures, practicals, and challenge students to use the techniques to analyse a prepared dataset.

The second half of the term is devoted to the **preparation for the research project**. Students will be encouraged to do their project with a recognized research institution, outside of KCMC in order to develop their ideas and work. The research project is a compulsory part of the MSc EAB (and all Masters level courses in KCMU College).

The second year will start with a three month **field rotation placement**. Students would be expected to work with different sections within a research organization outside of KCMC, in order to gain wider understanding of data processes, and data analysis.

In the second year of the MSc EAB three courses are delivered on **advanced statistical techniques** (Survival Analysis, Multi-level models and Advanced Statistical Analysis of Epidemiological Data using Stata). These courses are statistically intense and are compulsory for students on MSc EAB. Others students can take these courses, and those who want to take the course will be required to demonstrate adequate statistical expertise. The Advanced Statistical Analysis will review the concepts of confounding and effect modification in relation to linear regression, logistic regression and Poisson regression analysis. This course (Advanced Statistical Analysis) will be useful to any student doing an analysis-based research project, whether in KCMU College, or LSHTM DL students, or any other institution. The assessment of the course requires students to practice their techniques using a prepared dataset and to write a report demonstrating their understanding of the concepts.

The final part of the second year will be to complete the research project. The analysis and interpretation of their data could be done outside of KCMC with submission at the end of the term (usually the first few days in July).

Many of the modules covering epidemiological concepts, standard statistical techniques, and the advanced statistical techniques will also be offered as short, stand-alone courses available to external students from outside of KCMC.

More information on the course, and the fees for the course available at www.kcmuco.ac.tz.

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Course objectives for MSc Epi and Biostats

General course objectives

1. Produce graduates with adequate knowledge and skills in the field of epidemiology and biostatistics who are capable of applying the skills to the current major health related problems.
2. Enhance understanding of current medical literature that concerns epidemiological issues and enhance critical thinking in the interpretations of research findings in order to make appropriate decisions.
3. Enable qualified graduates to apply the knowledge and skills obtained during the course to design and carry out different types of epidemiological studies independently or in collaboration.
4. Provide a good basis for advanced studies leading to higher education, especially PhD and later postdoctoral studies.

Specific course objectives

1. Increased knowledge and understanding

Students will be able to demonstrate:

- Comprehensive knowledge and understanding of more advanced epidemiological and statistical concepts and methods, including in-depth knowledge of classical epidemiological designs and statistical techniques, their applications, strengths and limitations.
- knowledge of the conceptual frameworks, values and principles embedded within the discipline of epidemiology
- Knowledge of contemporary statistical methods, when to apply them and how to interpret and present the findings in a format suitable for both technical and non-technical persons.

2. Development of advanced intellectual skills

Students will be able to demonstrate:

- The skills to interpret and critically appraise epidemiological and statistical literature, including the strengths and limitations of the evidence from different studies, study designs and the different statistical analyses performed and inferences reached.
- the skills to identify the appropriate epidemiological study design and methods to test original hypotheses, and the ability to apply epidemiological concepts and methods in original contexts

3. Acquisition of professional practical skills

Students will be able to:

- Apply statistical approaches and epidemiological designs and methods in original contexts using a systematic and rigorous approach, with due consideration of the strengths and limitations of the relevant methodology.
- interpret, synthesise, critically appraise and draw evidence-based conclusions from bio-statistical and epidemiological data
- understand and employ terminology used in epidemiology and biostatistics and the wider field of public health
- offer technical advice and support to less technical persons
- prepare and teach large groups of undergraduate medical students

4. Attainment of transferable (key) skills

Students will be able to:

- systematically evaluate written and numeric information drawing justified conclusions from the evidence
- make decisions to address complex epidemiological problems
- communicate simple and complex knowledge or arguments in writing, discussing appropriately

Modules

The Master of Epidemiology and Applied Biostatistics will include a foundation course (including basic modules in research methods, epidemiology and statistics), advanced biostatistics modules, epidemiology/research modules, a field rotation and a research project. The modules have been arranged into 8 clusters and a research project.

- **Cluster 1: Foundation course and Research Management**
 - *Introduction to the course*
 - *Epidemiology*
 - *Biostatistics*
 - *Research methodology*
 - *Research management and leadership*
- **Cluster 2: Computing sessions**
 - *Introduction to Epi-Data*
 - *Introduction to Stata*
 - *Data collection MS Access*
- **Cluster 3: Teaching, critical thinking and learning skills**
 - *Statistical consultancy and teaching*
 - *Journal club*
- **Cluster 4: Advanced epidemiology modules**
 - *Advanced study designs I & II*
 - *Surveillance*
 - *Epidemiology of Communicable disease*
 - *Epidemiology of Non-communicable disease*
 - *Screening and diagnostics*
 - *Bioethics and GCP*
 - *Monitoring and evaluation*
- **Cluster 5: Biostatistics modules**
 - *Linear regression*
 - *Logistic regression*
 - *Likelihood theory*
- **Cluster 6: Advanced biostatistics modules**
 - *Poisson regression / Survival analysis*
 - *Survey analysis*
- **Cluster 8: Student work placement**
- **Cluster 9: Research Project**

