# UGHE/HARVARD MATHEMATICAL MODELING TRAINING

# Session one

# WEEK ONE: INTRODUCTION TO MATHEMATICAL MODELING

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| **Date** | **Time (tentative)** | **Activity** | **Instructor/facilitator** |
| Monday,  03/13/2023 | 8:00 - 8:30 am | Welcome | Bethany |
|  | 8:30 – 9:00 am | Lecture: Why do we need mathematical models? | Caroline |
|  | 9:00- 9:30 am | Lecture: Concepts in infectious disease epidemiology I | Sylvia |
|  | 9:30 - 10:00 am | Activity: Group work on “adopt a country” | Sylvia |
|  | 10:00 -10:30 am | *Coffee break* | |
|  | 10:30- 11:00 am | Activity: Group work on “adopt a country” | Sylvia |
|  | 11:00- 11:30 am | Lecture: Concepts in infectious disease epidemiology II | Sylvia |
|  | 11:30 am - 12: 30 pm | Activity: Contact and superspreading events | Emmanuel N |
|  | 12:30 - 1:30 pm | *Lunch* | |
|  | 1:30 - 2:30 pm | Guest lecture: COVID-19 math modeling in Africa | Njoki Kimani |
|  | 2:30 - 3:30 pm | Activity: why modeling for project? | Emmanuelle D |
|  | 3:30 - 3:45 pm | *Coffee break* | |
|  | 3:45 – 4:15 pm | Lecture: Overview of modeling structures and key components of a model. | Caroline |
|  | 4:05- 5:15 pm | Activity: Natural history of selected disease for project. | Emmanuelle D |
|  | 5:30 -6:15 pm | Mental health break |  |
|  | 6:30- 7:30 pm | *Dinner* |  |
|  | 7:30 – 8:30 pm | Optional evening session | Faculty on duty |

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| **Date** | **Time (tentative)** | **Activity** | **Instructor/facilitator** |
| Tuesday,  03/14/2023 | 8:00 - 8:10 am | Lecture: Modeling assumptions and limitations | Caroline |
|  | 8:10 – 9:10 am | Activity: Berkeley Madonna Tutorial | Emmanuelle D |
|  | 9:10 – 10:00 am | Activity: Getting started with building models- headache model exercise. | Sylvia |
|  | 10:00 -10:30 am | *Coffee break* | |
|  | 10:30- 11:00 am | Lecture: Introduction to the basic SIR model | Emmanuelle D |
|  | 11:00 am - 12:30 pm | Activity: SIR model for measles in a close versus open population (word doc) | Sylvia |
|  | 12:30 - 1:30 pm | *Lunch* | |
|  | 1:30 - 3:30 pm | Activity: Simulating measles model (BM) | Emmanuelle D |
|  | 3:30 - 3:45 pm | Coffee break | |
|  | 3:45 - 5:15 pm | Activity: Work on project- defining the SIR for your project | Emmanuel N |
|  | 5:30 - 6:15 pm | Zumba activity | Sylvia/Bethany |
|  | 6:30 - 7:30 pm | *Dinner* |  |
|  | 7:30 - 8:30 pm | Optional evening session | Faculty on duty |

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| **Date** | **Time (tentative)** | **Activity** | **Instructor/facilitator** |
| Wednesday,  03/15/2023 | 8:00 - 8:45 am | Lecture: Introduction to basic reproduction number and epidemic thresholds. | Caroline |
|  | 8:45 – 10:00 am | Activity: Case study on estimating Ro for a disease. | Sylvia |
|  | 10:00 -10:30 am | *Coffee break* | |
|  | 10:30- 11:00 am | Lecture: Adding complexity to the basic SIR model  -SEIR model and SEAIR models. | Emmanuelle D |
|  | 11:00 am - 12: 30 pm | Activity: Modeling COVID-19 (word doc) | Emmanuelle D |
|  | 12:30 - 1:30 pm | *Lunch* | |
|  | 1:30 - 3:00 pm | Panel discussion (virtual): current trends in math modeling in Africa | Caroline |
|  | 3:00 - 3:30 pm | Lecture: study teams and authorships | Bethany |
|  | 3:30 - 3:45 pm | *Coffee break* | |
|  | 3:45 – 4:55 pm | Activity: modeling COVID-19 (BM). | Emmanuelle D |
|  | 4:55- 5:15 pm | Activity: Defining “L” and “A” in a group project. | Emmanuel N |
|  | 5:30 -6:15 pm | Mental health break |  |
|  | 6:30- 7:30 pm | *Dinner* |  |
|  | 7:30 - 8:30 pm | Optional evening session | Faculty on duty |

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| **Date** | **Time (tentative)** | **Activity** | **Instructor/facilitator** |
| Thursday,  03/16/2023 | 8:00 - 8:20 am | Lecture: Extending the SIR model to include compartments to assess health outcomes | Sylvia |
|  | 8:20 – 10:00 am | Activity: COVID-19 model with deaths, hospitalization, and isolation (word doc). | Sylvia |
|  | 10:00 -10:30 am | *Coffee break* | |
|  | 10:30- 11:30 am | Activity: COVID-19 model with deaths, hospitalization, and isolation (BM). | Emmanuelle D |
|  | 11:30 am - 12: 30 pm | Activity: Health outcomes for project | Emmanuel N |
|  | 12:30 - 1:30 pm | *Lunch* | |
|  | 1:30 – 2:00 pm | Lecture: Modeling interventions | Emmanuelle D |
|  | 2:00 - 3:30 pm | Activity: COVID-19 vaccine modeling (word) | Sylvia |
|  | 3:30 - 3:45 pm | *Coffee break* | |
|  | 3:45 – 4:45 pm | Activity: COVID-19 vaccine modeling (BM) | Sylvia |
|  | 4:45- 5:15 pm | Activity: Modeling interventions for project | Bethany |
|  | 5:30 - 6:15 pm | Zumba | Sylvia/Bethany |
|  | 6:30 - 7:30 pm | Dinner |  |
|  | 7:30 - 8:30 pm | Optional evening session |  |

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| **Date** | **Time (tentative)** | **Activity** | **Instructor/facilitator** |
| Friday,  03/17/2023 | 8:00 - 8:20 am | Lecture: Parameterization of models | Caroline |
|  | 8:20 – 10:00 am | Activity: presentations of background and lit review of the project. | Bethany |
|  | 10:00 -10:30 am | Coffee break | |
|  | 10:30- 11:30 am | Activity: finalizing research question and study team. | Emmanuelle D |
|  | 11:30 am - 12: 00 pm | Course evaluation | Sylvia |
|  | 12:00 pm | Lunch | |