

# INLABRU WORKSHOP

ICES 2025, Copenhagen

Jafet Belmont, Sara Martino and Janine Illian

## 1 Welcome to the course!

- Welcome to the `inlabru` workshop!
- The aim of this workshop is to introduce you to a range of statistical modelling approaches, in particular the temporal, spatial and spatio-temporal modelling as implemented in the `inlabru` package.
- Workshop materials are available in the github repository [inlabru-workshop](#)

## 2 Learning Objectives for the workshop

At the end of the workshop, participants will have an understanding of:

- the motivation for and the challenges of analysing and modelling spatial data
- statistical models used to analyse spatial and spatio-temporal data
- the implementation of these models in the `inlabru` package
- how to independently analyse spatial data with `inlabru`

## 3 Intended audience

The workshop aims to cater for participants with a range of different backgrounds, who is interested in analysing data with modern spatial and spatio-temporal statistical modelling approaches.

## 4 Prerequisites

Participants should be familiar with the R environment, and general statistical approaches for modelling such as regression, analysis of (co)variance, and generalized linear models.

No knowledge of R-INLA or `inlabru` is required.

## 5 Schedule

### 5.0.1 Day 1

Time	Topic
10:00 - 10:30	ICES information session
10:30 - 11:30	<b>Session 1: Introduction to <code>inlabru</code></b>
11:30 - 13:00	Practical Session 1
13:00 - 14:30	Lunch break ☐
14:30 - 15:30	<b>Session 2: Latent Gaussian Models and INLA</b>
15:30 - 15:45	Coffee Break ☐
15:45 - 16:45	Practical Session 2

Time	Topic
16:45 - 17:00	wrap-up and outlook

### 5.0.2 Day 2

Time	Topic
9:00 - 10:00	<b>Session 3: Temporal modelling and smoothing part 1</b>
10:00 - 10:30	Snack ☐
10:30 - 11:30	Temporal modelling and smoothing part 2
11:30 - 13:00	<b>Practical Session 3</b>
13:00 - 14:30	Lunch break ☐
14:30 - 15:30	<b>Session 5: Introduction to Spatial Statistics</b>
15:35 - 15:45	Coffee Break ☐
15:45 - 16:45	<b>Practical Session 4</b>
16:45 - 17:00	wrap-up and outlook

### 5.0.3 Day 3

Time	Topic
9:00 - 10:00	<b>Session 6: Areal Processes</b>
10:00 - 10:30	Snack ☐
10:30 - 11:30	<b>Session 7: Geostatistics</b>
11:30 - 13:00	<b>Practical Session 5</b>
13:00 - 14:30	Lunch break ☐
14:30 - 15:30	<b>Session 8: Spatial Point processes</b>
15:35 - 15:45	Coffee Break ☐
15:45 - 16:45	<b>Practical Session 5 continued</b>
16:45 - 17:00	wrap-up and outlook

### 5.0.4 Day 4

Time	Topic
9:00 - 10:00	<b>Session 9: Spatiotemporal models</b>
10:00 - 10:30	Snack ☐
10:30 - 11:30	<b>Session 10: Model comparison and evaluation</b>
11:30 - 13:00	<b>Practical Session 6</b>
13:00 - 14:30	Lunch break ☐
14:30 - 15:30	<b>Session 11: Multi-likelihood/joint likelihood models</b>
15:35 - 15:45	Coffee Break ☐
15:45 - 16:45	<b>Practical Session 7</b>
16:45 - 17:00	wrap-up and outlook

### 5.0.5 Day 5

Time	Topic
9:00 - 10:00	<b>Session 12: Zero inflated models</b>
10:00 - 10:30	Snack ☐
10:30 - 11:30	<b>Session 13: Complex observational processes: Distance Sampling</b>
11:30 - 13:00	Practical Session 8: <b>Zero Inflated models - Distance sampling</b>
13:00 - 13:15	Coffee Break ☐
13:15 - 14:00	<b>Closing session</b>

## 6 In preparation for the workshop

Participants are required to follow the below steps ahead of the first day of the workshop:

1. Check your R version, it should be at least 4.3....
2. Install **R-INLA**
3. Install inlabru (available from CRAN)

```
# Enable universe(s) by inlabru-org
options(repos = c(
  inlabruorg = "https://inlabru-org.r-universe.dev",
  INLA = "https://inla.r-inla-download.org/R/testing",
  CRAN = "https://cloud.r-project.org"
))

# Install some packages
install.packages("inlabru")
```

3. Make sure you have the latest R-INLA, inlabru and R versions installed.
4. Install the following libraries:

```
install.packages(c(
  "CARBayesdata",
  "DAAG",
  "dplyr",
  "FSAdata",
  "ggplot2",
  "gt",
  "lubridate",
  "magrittr",
  "mapview",
  "patchwork",
  "scico",
  "sdmTMB",
  "sf",
  "spatstat",
  "spdep",
  "terra",
  "tidyr",
  "tidyterra",
  "tidyverse"
))
```