

# INLABRU WORKSHOP

ICES 2025, Copenhagen

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## 1 Welcome to the course!

- Welcome to the `inlabru` workshop!
- The goal for the workshop is to introduce Bayesian statistics implemented using the `inlabru` package.
- Workshop materials in the github repository [inlabru-workshop](#)

## 2 Learning Objectives for the workshop

At the end of the workshop, participants will be able to:

- Understand the motivation and challenges linked to spatial data
- Understand the statistical models used to analyse spatial and spatio-temporal data
- Understand how to implement such models using the `inlabru` library
- Independently analyse spatial data collected at sea using `inlabru`

## 3 Intended audience

The tutorial is intended for anyone who desires to improve their analyses of data collected at sea, including those data that are used as inputs to fishery stock assessments.

## 4 Level

Participants should be familiar with the R environment, and general statistical approaches for modelling such as regression, analysis of covariance, and general linear models.

No knowledge of R-INLA is required.

## 5 Schedule Program

### 5.0.1 Day 1

| Time          | Topic  |
|---------------|--|
| 10:00 - 10:30 | ICES informative 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                                    |
| 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 | <b>Session 4: Temporal modelling and smoothing part 2</b> |
| 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: Multilikelihoods/joint likelihood</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 ☐                                 |

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

## 6 In preparation for the workshop

Participants are required to follow the next steps before the day of the workshop:

1. Install **R-INLA**
2. 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",
  "FSAdat",
  "ggplot2",
  "gt",
  "lubridate",
  "magrittr",
  "mapview",
  "patchwork",
  "scico",
  "sdmTMB",
  "sf",
  "spatstat",
  "spdep",
  "terra",
  "tidyr",
  "tidyterra",
  "tidyverse"
))
```