Scientific Computing in Matlab

Course Schedule

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Spring, 2023 - **Last update: Wednesday, December 28, 2022.**

All classes are Wednesdays from 9 am until 11 am and are held in the Aidekman Student Lounge (**ASL**), or Virtual, using Zoom (**ZM**). Days on which a CMBN Seminar follows class are marked by a \*.

Each Module *ends* with the class; you work on each Module ***before*** the class date, so that you can ask questions and finalize assignments during class (See Syllabus).

There are open slots at the end. If we progress rapidly through the course, we will add materials (suggestions for programming or data analysis techniques to cover are welcome!), but otherwise we will adjust the schedule to split one topic across two weeks, or to give you more time to work on assignments and your project. In other words, these dates are tentative. Check the GitHub Discussion Forum for the currently active Module(s).

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| **Topics** | **Module** | **Date** | **Where** |
| **Getting Organized**  *Search path, Folders, Namespaces, Version Control* | 1 | 1/18\* | ZM |
| **Structured Programming**  *Style, Cell-Mode, Documentation, Modularity, Flexible Functions, Debugging, Lint, Profiling, Publish, MLX* | 2 | 1/25 | ASL |
| **Data representation**  *Matrices, Cell Arrays, Structures, Tables* | 3 | 2/1 | ZM |
| **Publication Quality Graphics**  *Figures, axes, labels, annotation, sizing, scaling, handle graphics, images, exporting for publication, importing published figure.* | 4 | 2/8 | ZM |
| **Import and Exporting Data**  *Reading and writing text and binary data, common data formats.* | 5 | 2/15\* | ZM |
| **Parametric Statistical Analysis - I**  *T-Test, ANOVA, Linear mixed models, fixed and random effects.* | 6 | 2/22 | ASL |
| **Parametric Statistical Analysis - II**  *Generalized linear mixed models, rankit* | 7 | 3/1 | ZM |
| **Spectral Analysis - I**  *Fourier, Spectrograms, Filtering, Coherence, Phase Locking* | 8 | 3/8 | ZM |
| **No Class - Spring Recess** | | | |
| **Spectral Analysis - II**  *Fourier, Spectrograms, Filtering, Coherence, Phase Locking* | 9 | 3/22 | ZM |
| **Curve Fitting** *Linear and nonlinear curve fitting* | 10 | 3/29\* | ASL |
| **Dimensionality Reduction and Classification** *PCA, SVM, cross-validation.* | 11 | 4/5 | ZM |
| **Nonparametric Statistical Analysis**  *Rank tests, bootstrap permutation tests.* | 12 | 4/12 | ZM |
| **Open Slot**  *Your favorite topics here* | 13 | 4/19 | ZM |
| **Open Slot**  *Your favorite topics here* | 14 | 4/26 | ZM |
| **Individual meetings**  *Feedback on final project draft* | 15 | 5/3 | ASL |
| **Final Project Due** | 16 | 5/10 | - |

# Project Progress

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| **Module** | **Stage** |
| 5 | Prototype data import |
| 8 | Prototype selection/preprocessing |
| 9 | Prototype analysis |
| 14 | Full Draft (including visualization) |
| 15 | Final Version |