Course Details

Fundamentals of Radio Interferometry

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NASSP 2016

Pre-requisites

Maths:

- Linear algebra
- Multi-variate calculus
- Complex numbers
- Least squares minimization
- Periodic functions and Fourier transforms
- Nyquist sampling

Computing:

- Python (ipython notebooks)
- Linux
- SSH

Physics:

- Electrodynamics
- Optics

Course Textbook

Fundamentals of Radio Interferometry
https://github.com/griffinfoster/fundamentals_of_interferometry

Written by SKA South Africa researchers.

ipython-based interactive notebooks, there are static PDF versions of each notebook.

Each lecture is related to a chapter or section of the book.

This is our first time using the book. We would like to improve the content and how it is taught. Please help.

Lecture Schedule

March 15 (Tues): Introduction to Radio Interferometry
March 17 (Thur): Radio Science

Holiday

April 5 (Tues): Fourier Transforms Theory and the Visibility Space (part 1)
April 7 (Thur): Discrete Fourier Transforms and Practical Session
April 12 (Tues): Visibility Space (part 2)
April 14 (Thur): Practical Session
April 19 (Tues): Imaging (part 1)
April 21 (Thur): Imaging (part 2)
April 26 (Tues): Deconvolution (part 1)
April 28 (Thur): Deconvolution (part 2)

May 3 (Tues): Practical Session
May 6 (Fri): The Radio Interferometric Measurement Equation (RIME)
May 10 (Tues): Instrumentation
May 13 (Fri): Calibration
May 17 (Tues): Practical Session
May 20 (Fri): Exam Talks and Questions

Practicals in the NASSP Computing Lab, Maths Building Room 408

Lecture Assessment

For **anyone** who attends a lecture:

We need you to assess the quality of the lectures and practicals, so you will be given the last 5-10 minutes of the lectures and practicals to write down your opinion about the lecture. This will be anonymous, but you will be given marks for turning something in.

What worked?
What did not?
What did you not understand?
What could be improved?
etc.

Practicals and Assignments

Practicals (7 hours):

April 7 (1 hour) : Fourier transforms

April 14 (2 hours) : Introduction to Measurement Sets and CASA, Examining and Plotting Data, Basic Imaging

May 3 (2 hours) : Imaging, Deconvolution, Source Finding

May 17 (2 hours) : Flagging, Calibration, Self-Calibration Loop

Assignments:

1. Positional Astronomy and Visibility Space, due April 14
2. Implementation of CLEAN, due May 6
3. Implementation of StEfCal, due May 27 (extra)

Exam

Written report on reducing a KAT-7 dataset including: flagging, calibration, imaging, deconvolution, and source finding.

A 5-10 minute presentation covering your results on May 20.

We will give out the data sets and exam in a few weeks, you will have most of the course to work on the report.

You will be allowed to turn in a revised version of your report before May 27 if you wish.

Course Website

Main Site:

https://griffinfoster.github.io/fundamentals_of_interferometry

Book:

https://github.com/griffinfoster/fundamentals_of_interferometry

E-mail:

griffin.foster@gmail.com