Measurement, Sensors and Design of Experiments

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Author Note

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Measurement, Sensors and Design of Experiments

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# DoE Tools

[The first two heading levels get their own paragraph, as shown here. Headings 3, 4, and 5 are run-in headings used at the beginning of the paragraph.]

## Python

### PyDOE (python v3.7)

Repo: <https://github.com/tirthajyoti/doepy>

Docs:

* <https://doepy.readthedocs.io/en/latest/#how-to-use-it>
* <https://pythonhosted.org/pyDOE/factorial.html#factorial>

#### Installation

pip install numpy

pip install pandas

pip install pydoe

pip install diversipy

Note: numpy, pandas may be installed through conda. Additionally, install matplotlib.

#### Common Commands

build.full\_fact(

{'Pressure':[40,55,70],

'Temperature':[290, 320, 350],

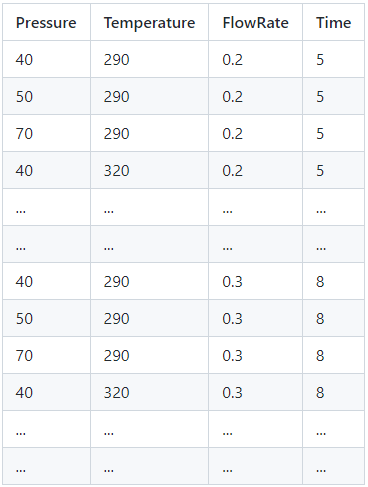
'Flow rate':[0.2,0.4],

'Time':[5,8]}

)

This will build a full factorial experiment for 36 entries.

Table 1 - full-factorial DOE [ref doepy]



Type of factorial experiments supported

* Full factorial: build.full\_fact()
* 2-level fractional factorial: build.frac\_fact\_res()
* Plackett-Burman: build.plackett\_burman()
* Sukharev grid: build.sukharev()
* Box-Behnken: build.box\_behnken()
* Box-Wilson (Central-composite) with center-faced option: build.central\_composite() with face='ccf' option
* Box-Wilson (Central-composite) with center-inscribed option: build.central\_composite() with face='cci' option
* Box-Wilson (Central-composite) with center-circumscribed option: build.central\_composite() with face='ccc' option
* Latin hypercube (simple): build.lhs()
* Latin hypercube (space-filling): build.space\_filling\_lhs()
* Random k-means cluster: build.random\_k\_means()
* Maximin reconstruction: build.maximin()
* Halton sequence based: build.halton()
* Uniform random matrix: build.uniform\_random()

## MATLAB

## Minitab

## JMP

# Material

## Useful Links

NIST DoE: <https://www.itl.nist.gov/div898/handbook/pri/pri.htm>

Kaggle DoE Brief: <https://www.kaggle.com/code/qwp8510/design-of-experiments-doe-briefing/notebook>

Lecture Notes on Design & Analysis of Experiments: <https://github.com/fcampelo/Design-and-Analysis-of-Experiments>

Links:

<https://canvas.bham.ac.uk/courses/66292/pages/2-1-doe-fundamentals?module_item_id=2857645>

<https://www.google.com/search?q=design+of+experiments+dataset&rlz=1C1GCEA_enGB1043&oq=design+of+experiments+dataset&aqs=chrome..69i57j0i390l4.4406j1j4&sourceid=chrome&ie=UTF-8>

<https://www.kaggle.com/code/qwp8510/design-of-experiments-doe-briefing/notebook>

<https://doepy.readthedocs.io/en/latest/#quick-start>

<https://pythonhosted.org/pyDOE/factorial.html#factorial>

<https://github.com/tirthajyoti/doepy>

<https://www.itl.nist.gov/div898/handbook/pri/pri.htm>

<https://github.com/fcampelo/Design-and-Analysis-of-Experiments>

<https://github.com/search?q=design+of+experiments>

<https://en.wikipedia.org/wiki/Design_of_experiments>

<https://github.com/tirthajyoti/doepy>

<https://canvas.bham.ac.uk/courses/66292/pages/feedback>

<https://canvas.bham.ac.uk/courses/66292/pages/assessment?module_item_id=2857604>

<https://canvas.bham.ac.uk/courses/66292/pages/course-timetable?module_item_id=2857600>

# Materials

## Part 1

## Part 2

References

Last Name, F. M. (Year). Article Title. *Journal Title*, Pages From - To.

Last Name, F. M. (Year). *Book Title.* City Name: Publisher Name.

Tables

Table 1

[Table Title]

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| Column Head | Column Head | Column Head | Column Head | Column Head |
| Row Head | 123 | 123 | 123 | 123 |
| Row Head | 456 | 456 | 456 | 456 |
| Row Head | 789 | 789 | 789 | 789 |
| Row Head | 123 | 123 | 123 | 123 |
| Row Head | 456 | 456 | 456 | 456 |
| Row Head | 789 | 789 | 789 | 789 |

Note: [Place all tables for your paper in a tables section, following references (and, if applicable, footnotes). Start a new page for each table, include a table number and table title for each, as shown on this page. All explanatory text appears in a table note that follows the table, such as this one. Use the Table/Figure style, available on the Home tab, in the Styles gallery, to get the spacing between table and note. Tables in APA format can use single or 1.5 line spacing. Include a heading for every row and column, even if the content seems obvious. A default table style has been setup for this template that fits APA guidelines. To insert a table, on the Insert tab, click Table.]

Figures title:

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