What is JEDIS?

JEDIS is a JMP Add-In for automating Design of Experiments (DOE) power calculations.
JEDIS simplifies answering questions like the following:

How many runs does my DOE need for 90% power across my factor-space?
Traditional DOE methods require iterative estimation to size a design for a specific power.

Define factors and levels

Estimate design size required*

Determine if power is sufficient

Repeat until design provides desired power

* For factorial designs: the number of design replications
  For optimal designs: the number of individual samples
JEDIS iterates through designs for you

Define factors and levels

Define input ranges

Run JEDIS

Select design

Inputs Ranges:
Number of replicates/runs
Signal-to-Noise Ratio
Alpha (1-Confidence)
Consider this motivational problem:

How many shots must the archer take to show, with confidence, his ability to hit the target’s center under varying conditions?
The first step for all DOEs is defining factors and levels.

<table>
<thead>
<tr>
<th>Response</th>
<th>Factors</th>
<th>Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miss distance</td>
<td>Range from target</td>
<td>10 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50 m</td>
</tr>
<tr>
<td>Angle of shot</td>
<td>15°</td>
<td></td>
</tr>
<tr>
<td></td>
<td>30°</td>
<td></td>
</tr>
<tr>
<td></td>
<td>45°</td>
<td></td>
</tr>
<tr>
<td></td>
<td>60°</td>
<td></td>
</tr>
</tbody>
</table>

Diagram:
- Miss distance from center
- Range from target
- Angle of shot

Diagram showing a bow and arrow with an arrow flying towards a target, indicating the concepts of range, angle, and miss distance. The bow and arrows are labeled with the terms 'Angle' and 'Miss distance' respectively, while the target is labeled with the term 'Range'.
Let's walk through JEDIS for this example archery DOE

**Step 1**
Open JEDIS and choose “Make Full Factorial Design”

**Step 2**
Construct DOE by adding factors and levels as normal in JMP

**Step 3**
Specify ranges for parameters and then let JEDIS run
Video demo of JEDIS for archery DOE, in real time

Using JEDIS for a simple, Full-Factorial DOE. Played back in real speed.
Recall our original motivation for JEDIS:

How many runs does my DOE need for 90% power across my factor-space?
For this example, 90% power across all factors is possible at 80% confidence with 132 shots for a SNR of 1.
Lets explore the default JEDIS plot and some other plotting options available to you in JMP

This is the default JEDIS plot.

It shows Power vs.
- Number of runs,
- Signal to Noise Ratio,
- and Alpha (1-Confidence)
JEDIS (Light) also works for pre-made designs

Perhaps you read a design in a test-planning document and you’d like to explore it over a range of SNR and Alpha
JEDIS Light follows the same general procedure as JEDIS.
Wrap up: JEDIS is an easy to use tool for DOE automation

✓ Fully GUI based
✓ Enables exploration of design replicates, SNR, and alpha
✓ Allows DOE construction on-the-fly or loading from script
✓ Handles full factorial, D/I/α-optimal, and disallowed combinations
✓ Writes results in easy to use format (Tidy data)
✓ Automatically generates interactive data visualizations
Step-by-step instructions and detailed documentation accessible from JEDIS main menu
Questions?
Remaining slides are back up.

JEDIS how-to and extra notes.
How to use JEDIS
Step 1: Select JEDIS from JMP Add-Ins menu*

Step 2: Choose type of DOE to run, or load a design script

*See final slide for JEDIS installation instructions
Step 3: Follow normal JMP procedures to set up DOE

- Factors
- Levels
- Model Terms
- Disallowed combinations

Clicking ‘Make Design’ will run the JMP design builder, not JEDIS. Click ‘Run JEDIS’ instead.
Step 4: Specify parameters for power calculations

JEDIS Parameters -- Choose range of replicates/runs, signal to noise ratios, and alpha levels.

Please change the inputs below, or use the defaults.
For custom designs, the optimal design is recomputed for each number of runs increment.

- Number of Runs
  - Minimum: 60
  - Maximum: 660
  - Increment: 120
  - Hold Fixed? Yes

- Signal to Noise Ratio
  - Minimum: 0.5
  - Maximum: 1
  - Increment: 0.1
  - Hold Fixed? Yes

- Alpha (1-Confidence)
  - Minimum: 0.05
  - Maximum: 0.2
  - Increment: 0.05
  - Hold Fixed? Yes

Advanced Options

Proceed
Step 5: After running, view and save results
Step 6: Now you have your data – explore as you please!

Data saved in Tidy format
One variable per column &
One observation per row
How to use JEDIS Light
Step 1: Open your design table in JMP
Step 2: Run JEDIS Light from JMP Add-Ins menu

Step 3: Verify table formatting & specify parameters
Step 4: Specify the model, add interactions if desired
Step 5: View and save results, just like in JEDIS
Extra Notes and Tips
JEDIS add-in menu advanced options

From the JEDIS Advanced Options menu you can replot any saved JEDIS data and modify any default JEDIS parameters.
JEDIS parameter advanced options

Change Anticipated Coefficients
Allows you to select the alternative hypotheses with which JEDIS will test your DOE

Set Random Seed
Allows you to specify the random seed used for design generation

Adjust Custom Design Search Time
Allows you to specify how long JMP will search for an optimal solution to a design
How to save a DOE script in JMP in three clicks

1. Open the DOE - JMP window.

2. Click on the Full Factorial Design menu and select Save Script to Script Window.

3. The script window will appear with the saved script.
Notes about saving scripts

Saving must be done **before** pressing the “Run JEDIS” button!

Saving a script is a JMP feature available in ANY window.

Saving scripts is not specific to JEDIS, but right now it is the only way to save a DOE for later use.
How to change JMP’s custom design optimality criterion

1. JEDIS uses JMP’s recommended optimality criterion by default, but you can select the type you want when you construct your DOE.
How to install the JEDIS JMP Add-In

Method 1: Install from the Add-In file
(works if your computer recognizes .jmpaddin files)

1. Double click the Add-In

2. Click “Install” when prompted

Method 2: Open the Add-In from JMP

1. Select File -> Open from JMP

2. Open the Add-In file

3. Click “Install” when prompted
   (see method 1)