

HIGH PERFORMANCE RESEARCH COMPUTING

Fundamentals of R Programming

HPRC Training

8 March 2024



High Performance
Research Computing

DIVISION OF RESEARCH



Course Outline

1. Accessing Grace
2. Launching RStudio
3. Arithmetic Operators
4. Data Types and Variables
5. Built-in Functions
6. Vectors
7. Matrices
8. Data Frames

Accessing the HPRC Grace Portal

The screenshot shows the Texas A&M High Performance Research Computing website. The header includes the AT&M logo, the text "TEXAS A&M HIGH PERFORMANCE RESEARCH COMPUTING", and social media icons for Twitter, YouTube, and LinkedIn. The navigation menu contains links for Home, User Services, Resources, Research, Policies, Events, Training, About, and Portal. The Portal link is highlighted with a red box. A dropdown menu is open under Portal, listing Terra Portal, Grace Portal (highlighted with a red box), FASTER Portal, FASTER Portal (ACCESS), ACES Portal (ACCESS), and Launch Portal (ACCESS). Below the navigation is a banner image of server racks. On the left, there are sections for "Quick Links" and "User Guides". The main content area features a diagram illustrating a biological process: a 3D protein structure is shown with a green plasmid DNA molecule being introduced into a cell. The cell is labeled "Cell" and contains a "Nucleus".

Quick Links

- New User Information
- Accounts
 - Apply for Accounts
 - Manage Accounts
- User Consulting
- Training
- Knowledge Base
- Software
- FAQ

User Guides

- ACES
- FASTER
- Grace
- Terra

Portal

- Terra Portal
- Grace Portal
- FASTER Portal
- FASTER Portal (ACCESS)
- ACES Portal (ACCESS)
- Launch Portal (ACCESS)

HPRC webpage: hprc.tamu.edu

Launching RStudio on Grace

The screenshot shows the TAMU HPRC OnDemand (Grace) web interface. The top navigation bar includes 'Files', 'Jobs', 'Clusters', 'Interactive Apps', 'Dashboard', 'My Interactive Sessions', 'Develop', and 'Help'. The 'Interactive Apps' menu is open, displaying a list of applications categorized by domain: BIO, GUI, Imaging, and Servers. The 'RStudio R 4.1.0+' option is highlighted with a red box. Other applications listed include Beuti, CRISPR-Local, Gap5, IGV, Mauve, RNAlysis, Structure, XtalOpt, ANSYS Workbench, Abaqus/CAE, LS-PREPOST, MATLAB, ParaView, VNC, ChimeraX, Diffusion Toolkit & TrackVis, Fiji, ImageJ, VMD, cisTEM, CryoSPARC 3.3.1, CryoSPARC 4, Jupyter Notebook, JupyterLab, RStudio R 4.0.3, 3.6.3, Spark-Jupyter Notebook, and TensorBoard.

OnDemand provides an integrated, single...
Message of the Day
IMPORTANT POLICY INFORMATION
• Unauthorized use of HPRC resources is pr
• Use of HPRC resources in violation of Unit
legal residents.
• Sharing HPRC account and password info
• Authorized users must also adhere to ALL
!! WARNING: THERE ARE ONLY NIGHTLY BACKUP.
Demand

resources.
osecution.
regulations is prohibited. Current HPRC staff members are US
Any shared accounts will be DISABLED.
policies

RStudio R 4.1.0+ version: 2023.09.1-494

This app will launch RStudio Server with Singularity and the R_tamu software module on a compute node.

You can install your own R packages directly within RStudio.

R version

R/4.3.1

Number of hours (max 168)

8

Number of CPU cores (max 48)

1

Total Memory in GB (max 360)

8

Number of A100 GPUs to use

0

Select a value larger than 0 to use the GPU nodes

I would like to receive an email when the session starts

Slurm account (optional)

This field is needed ONLY IF you want to use a different account other than your default account. Leave it blank if you don't know what to provide.

Launch

Set number of hours to 8

Set number of cores to 1

Click "Launch" once the correct parameters have been selected

Home / My Interactive Sessions

Interactive Apps
BIO
Beauti
CRISPR-Local
Gap5
IGV
Mauve
RNAlysis
Structure
XtalOpt
GUI
ANSYS Workbench
Abaqus/CAE

RStudio R 4.1.0+ (9866782)

1 node | 1 core | Running

Host: c322 Delete

Created at: 2024-03-06 09:24:35 CST

Time Remaining: 7 hours and 59 minutes

Session ID: c771069e-f617-421c-b47f-2dbf30793803

[Connect to RStudio Server](#)

Click this button when it says "Connect to RStudio Server" (this will take a minute)

RStudio Interface

Console: Allows users to input R commands directly

Terminal: Allows shell access to the node

Files: File Browser: Allows users to interact with file system

Plots: Displays user-generated graphs/figures

Packages: Load and install packages

Help: Access help pages for functions and packages

Accessing the Course Materials

- Open the terminal tab in the portal (Clusters > ACES_shell_acces) and run the following commands:

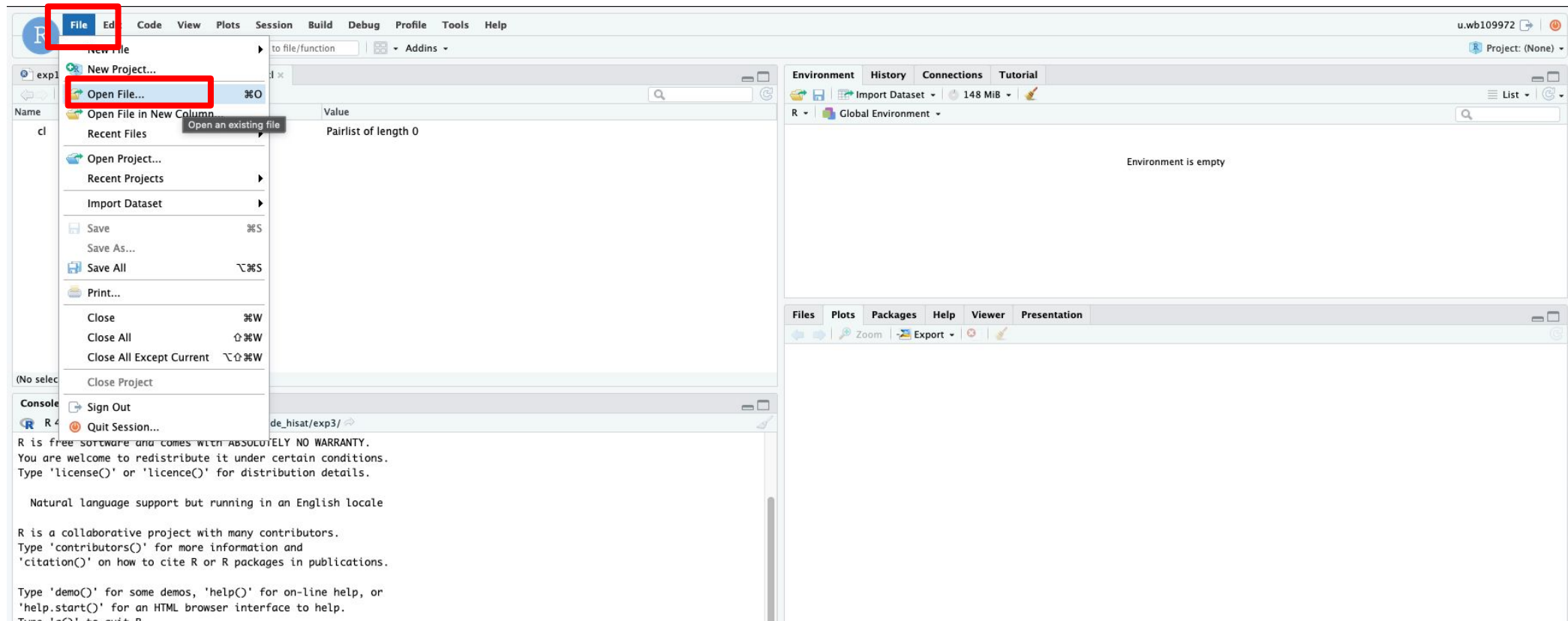
```
[user@grace1 ~]$ cp -r /scratch/training/FundamentalsOfR/ .  
[user@grace1 ~]$ cd FundamentalsOfR/  
[user@grace1 ~]$ ls
```

The output should read:

```
carnivores.csv  carnivores.xlsx  datascience.xlsx  FundamentalsOfR.Rmd
```

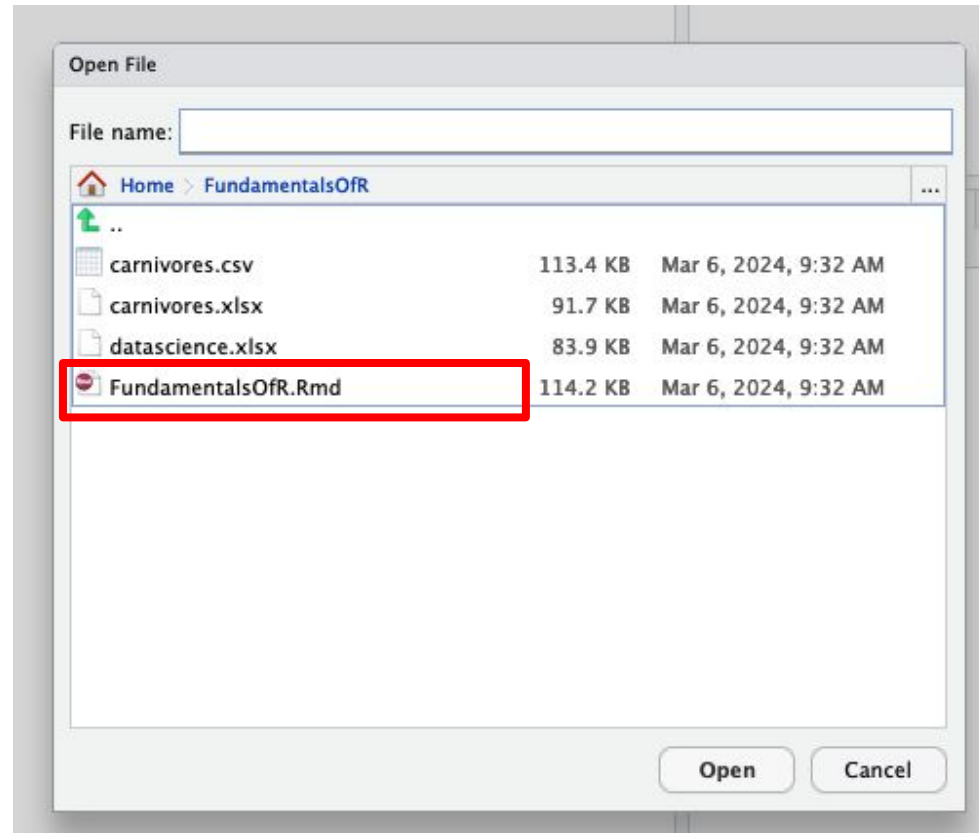

Accessing the Course Materials

- Next, in the upper left corner, select File > Open File



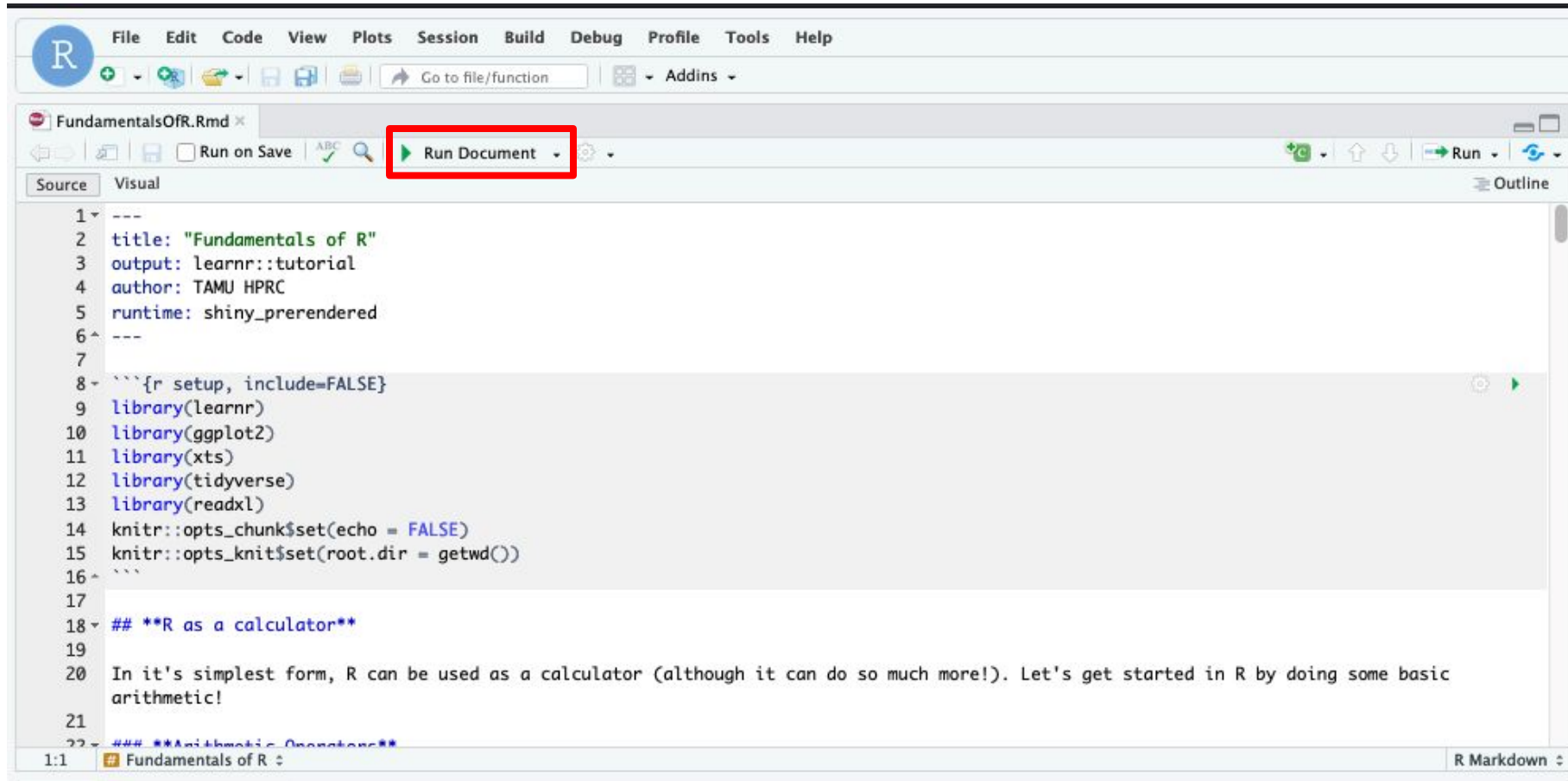
Accessing the Course Materials

- Navigate to the DataScienceR directory and select “IntroductionToDataScienceInR.Rmd”



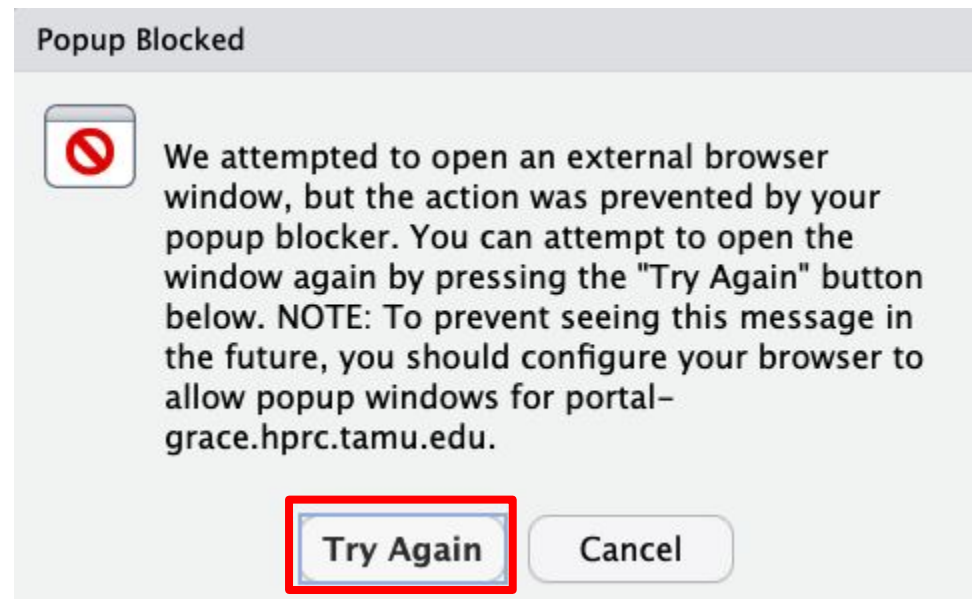
Accessing the Course Materials

- Select “Run Document” from the toolbar to launch the workbook.



Accessing the Course Materials

- If you see a dialog box that says “Popup Blocked” click “Try Again”, and the workbook should open in a new tab.



Transition to Workbook

The screenshot shows a Mozilla Firefox browser window displaying a web page from <https://portal-grace.hprc.tamu.edu/rnode/c322/47580/?view=rmarkdown>. The page is titled "Fundamentals of R" and the current section is "R as a calculator". The left sidebar contains a navigation menu with the following items: "R as a calculator", "Data types", "Variables", "Built-in functions", "Vectors", "Flow control", "Matrices", "Time Series", "Factors", "Data Frames", "dplyr", "Importing and Exporting Data", "Regression", "Principal Component Analysis", and "Base Plotting Functions in R".

The main content area is titled "R as a calculator" and contains the following text: "In its simplest form, R can be used as a calculator (although it can do so much more!). Let's get started in R by doing some basic arithmetic!". Below this is a section titled "Arithmetic Operators" with a list of operators: Addition (+), Subtraction (-), Multiplication (*), Division (/), Exponentiation (^), and Modulo (%%).

Below the list of operators, the text reads: "Use the correct operators to complete the equations in the code chunks below." There are four code chunks, each with a "Start Over" button and a "Run Code" button. The code chunks are as follows:

```
R Code Start Over Run Code
1 # Add 12 and 3
2
3
```

```
R Code Start Over Run Code
1 # Subtract 7 from 11
2
3
```

```
R Code Start Over Run Code
1 # Multiply 27 by 9
2
3
```

```
R Code Start Over Run Code
```

Need Help? Contact the HPRC Helpdesk

Website: hprc.tamu.edu

Email: help@hprc.tamu.edu

Phone: (979) 845-0219

Help us help you -- we need more info

- Which Cluster (ACES, FASTER, Terra, Grace)
- NetID (NOT your UIN)
- Job id(s) if any
- Location of your jobfile, input/output files
- Application used, if any
- Module(s) loaded, if any
- Error messages
- Steps you have taken, so we can reproduce the problem