This course aims to improve the implementation and execution of reproducible research and analyses in the field of natural resources.

Students will be introduced to systematic data collection and data cleaning ("wrangling"), in a way that promotes reproducibility. They will be equipped with the tools to do this work using the R language, and will learn essential data management principles. Students will be familiarized with version control tools and online repositories.

This course is aimed at students engaged in research at the graduate level, as well as advanced undergraduate students interested in data-focused careers.

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Course evaluations

Student assessments are an important part of efforts to improve teaching and learning. Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/.

Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

Course resources and implementation

This course will be implemented using a blended learning approach. This means that you will be expected to complete work (with online resources) before the lab on Monday in order to do/finish the lab assignment.

Every week you will be asked to provide brief feedback on things you think went well or need improvement: this ongoing evaluation helps me provide you the most effective implementation of the course material.

Active involvement will be crucial, as I will “live-code” in labs – which means that students implement code along with me. I will also rely on students to communicate their challenges, implement peer-to-peer learning and practice collective problem solving.

There will be assignments every week, associated with the lab. The final project will be ideally revolve around your own data – but there will be projects to work with if you do not have data yet. You will be required to present your work to the class in poster format.

Course requirements

Ideally be familiar with the R programming language, but not required.

The textbooks and resources that we will use in this course are all available for free online, e.g.:

- R for Data Science by Garrett Grolemund and Hadley Wickham (https://r4ds.had.co.nz/index.html)
- The tidyverse style guide by Hadley Wickham (https://style.tidyverse.org/)
- Ggplot2: elegant graphics for data analysis by Hadley Wickham (https://ggplot2-book.org/)

You will need to bring a laptop to this class, with R (https://www.r-project.org/) and Rstudio (https://rstudio.com/) installed.

About the instructor

Dr. Geraldine Klarenberg is a lecturer in quantitative data science in the School of Forest Resources. She has a PhD in Agricultural and Biological Engineering (UF) and an MSc in Tropical Land Use / Irrigation (Wageningen University).

Teaching philosophy: I like to see my classroom as a community and I specifically promote interaction and peer learning. I believe that interactive work and learning-by-doing are the best ways to gain skills and retain knowledge. Most of all, I want everyone to enjoy their learning journey and feel valued!
Grading policy

Assignments ................................. 10 points each
Final project ................................. 50 points

Assignments compose 75% of the final grade, the final project 25%.

**Grading Policy**

- **A** 90.0-100
- **B+** 86.7-89.9
- **B** 83.7-86.6
- **B-** 80.0-83.6
- **C+** 76.7-79.9
- **C** 73.7-76.6
- **C-** 70.0-73.6
- **D+** 66.7-69.9
- **D** 63.7-66.6
- **D-** 60.0-63.6
- **E** < 60.0

More information on UF grading policy may be found at: [https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx](https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx)

Class expectations

**Attendance**

Attendance is strongly encouraged, especially labs.

If you will be absent, inform the instructors at least a week in advance.

In the case of emergency absences, inform the instructors as soon as possible.

Excused absences must be consistent with university policies in the Graduate Catalog (http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance) and require appropriate documentation. Additional information can be found here: [https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx](https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx)

Late / make-up work

Late assignments will be graded as follows:

- < 24 hrs: -10%
- < 48 hrs: -25%
- > 48 hrs: -50%

Make up work: contact the instructor to agree on new deadlines (only for excused absences)

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**Code of Conduct**

We are dedicated to providing a welcoming and supportive environment for all people, regardless of background or identity. By participating in this community, participants accept to abide by these ground rules. Any form or behavior to exclude, intimidate, or cause discomfort is a violation of these ground rules. In order to foster a positive and professional learning environment we expect and encourage the following kinds of behaviors in all platforms and events:

- Use welcoming and inclusive language
- Be respectful of different viewpoints and experiences
- Gracefully accept constructive criticism
- Focus on what is best for the community
- Show courtesy and respect towards other community members
Honesty policy

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code.” On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions.

Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Software use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Health and wellness

Health and wellness

U Matter, We Care:

If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

Counseling and Wellness Center:

http://www.counseling.ufl.edu/cwc, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or http://www.police.ufl.edu/.

Academic resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml.


Library Support, http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. https://teachingcenter.ufl.edu/.


## Course schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon 6 Jan</td>
<td>Introductions and install software</td>
</tr>
<tr>
<td>Wed 8 Jan</td>
<td>Research: reproducibility, data lifecycle</td>
</tr>
<tr>
<td>Mon 13 Jan</td>
<td>Lab - Reproducibility</td>
</tr>
<tr>
<td>Wed 15 Jan</td>
<td>Introduction to R</td>
</tr>
<tr>
<td>Mon 20 Jan</td>
<td>Holiday – no lab</td>
</tr>
<tr>
<td>Wed 22 Jan</td>
<td>Lab - Introduction to R</td>
</tr>
<tr>
<td>Mon 27 Jan</td>
<td>Lab – Introduction to R</td>
</tr>
<tr>
<td>Wed 29 Jan</td>
<td>Spreadsheets for data collection &amp; programming for data analysis: good practices</td>
</tr>
<tr>
<td>Mon 3 Feb</td>
<td>Lab – Good practices (spreadsheets &amp; programming)</td>
</tr>
<tr>
<td>Wed 5 Feb</td>
<td>Version control</td>
</tr>
<tr>
<td>Mon 10 Feb</td>
<td>Lab – Version control</td>
</tr>
<tr>
<td>Wed 12 Feb</td>
<td>Introduction to tools: tidyverse</td>
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<tr>
<td>Mon 17 Feb</td>
<td>Lab - Tidyverse</td>
</tr>
<tr>
<td>Wed 19 Feb</td>
<td>More advanced R for data cleaning and automation</td>
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<tr>
<td>Mon 24 Feb</td>
<td>Lab – More advanced R</td>
</tr>
<tr>
<td>Wed 26 Feb</td>
<td>Downloading and operationalizing large datasets</td>
</tr>
<tr>
<td>Mon 9 Mar</td>
<td>Lab – Large datasets</td>
</tr>
<tr>
<td>Wed 11 Mar</td>
<td>Tidy data in R</td>
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<tr>
<td>Mon 16 Mar</td>
<td>Lab – Tidy data in R</td>
</tr>
<tr>
<td>Wed 18 Mar</td>
<td>Tidy data in R (incl visualization)</td>
</tr>
<tr>
<td>Mon 23 Mar</td>
<td>Lab – Tidy data in R (incl visualization)</td>
</tr>
<tr>
<td>Wed 25 Mar</td>
<td>Spatial data</td>
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<tr>
<td>Mon 30 Mar</td>
<td>Lab – Spatial data</td>
</tr>
<tr>
<td>Wed 1 Apr</td>
<td>Shiny apps and RMarkdown</td>
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<tr>
<td>Mon 6 Apr</td>
<td>Lab – Shiny or RMarkdown</td>
</tr>
<tr>
<td>Wed 8 Apr</td>
<td>Meta data, repositories and data management plans</td>
</tr>
<tr>
<td>Mon 13 Apr</td>
<td>Lab: project presentations</td>
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<tr>
<td>Wed 15 Apr</td>
<td>Project</td>
</tr>
<tr>
<td>Mon 20 April</td>
<td>Lab: project presentations</td>
</tr>
<tr>
<td>Wed 22 Apr</td>
<td>Project</td>
</tr>
</tbody>
</table>

**Assignments**
- 15 January
- 22 January
- 29 January
- 5 February
- 12 February
- 19 February
- 26 February
- 11 March
- 18 March
- 25 March

**Presentations**
- 15 or 22 April

**Final project**
- 24 April

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*Course schedule, topics and assignment/project due dates are subject to change. If changes are necessary, these will be announced at least one week in advance, on Canvas.*