My Spring 2022 courses

Prerequisites for all my courses: curiosity, courage, and critical thinking. You must be willing to work on an agile project for the duration of the term and present your progress (or lack thereof) frequently in front of the whole class. Any questions? Come and talk to me or send me an email!

CSC 100 - Introduction to Programming with C/C++:

This course introduces you to system programming using C. We cover C++ as an extension. System programming is pure power: it enables you to converse with the computer at a level unknown to users of Python or other high-level languages. You also learn about: compilers, working on the command line, text editors like vi and Emacs, using C for Internet of Things (IoT) devices, cybersecurity, and using UML. You get a foundation in computational, critical thinking in concert with one of the three most popular languages (the other two are Python and Java).

DSC 205 - Introduction to Advanced Data Science:

For those who took DSC 105, this course continues the journey into data science using the functional language R. We focus on the art of machine learning, including classification models (used e.g. for spam detection), neural networks (linear models on steroids) and deep learning, image classification, text mining, and recommender systems. To join this course without having completed DSC 105, work through Norman Matloff's free online course *"fasteR:Fast Lane to Learning R!*" on GitHub, and through the DataCamp course "Introduction to R"[1]. However, this is not an R course, but a course on predictive algorithms and applications using R.

CSC 330 - Database Theory and Applications:

You will learn a fair amount about SQL, the (by far) dominant data science language in the real world (for relational databases), and one of the oldest languages in use. We also work with SQLite, the world's most common database, and we model databases with UML and Entity-Relationship diagrams. We cover XML and NoSQL databases, Big Data, and aspects of physical database organization. As a capstone, we build our own database application, accessed with your programming language of choice - C, C++, Java, Python, R, or whatever you like.

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[1] You will have to document completion of the DataCamp entry level course. Contact me to get access – birkenkrahe@lyon.edu! There is also an entry quiz that you can use to test your understanding of the concepts.

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CSC 420 - Operating Systems:

Operating systems manage a computer's resources for its users and their applications. We focus on the underlying concepts, look at examples and try them out - my preferred sandbox being Linux, which you will be introduced to, including process management and simple shell programming. We also address concurrency and parallelization, cloud computing, memory, and storage management. We may use the Raspberry Pi as a platform to try stuff and get much closer to the machine than PC OS like Windows or MacOS allow. The lessons will directly lead to you feeling calm and powerful when working on your computer. A worthwhile investment!

Textbooks

CSC 100 – Introduction to programming

- *King, C Programming-A Modern Approach (2e), Norton (2008)*
- Seacord, Effective C, NoStarch (2021)
- Stroustrup, Principles of Programming in C++, Addison-Wesley (2014)

DSC 205 – Introduction to advanced data science

- *Matloff, The Art of Machine Learning, NoStarch (2022)*
- Glassner, Deep Learning-A Visual Approach, NoStarch (2021)
- Matloff, The Art of R Programming, NoStarch (2011)

CSC 330 – Database theory and applications

- *Baesens et al, Principles of Database Management, Cambridge U Press (2018)*
- DeBarros, Practical SQL - A Beginner's Guide to Storytelling with Data, NoStarch (2018)
- Kreibich, SQLite - Small. Fast. Reliable. Choose Any Three. O'Reilly (2010)

CSC 420 – Operating systems

- *Vanderbauwhede/Singer: Operating Systems with Linux on the Raspberry Pi, ARM (2019)*
- Anderson/Dahlin, Operating Systems: Principles and Practice (2e), Recursive (2015)
- Silberschatz et al, Operating System Concepts (10e), Wiley (2021)