Textbooks and Readings

Last modified: 2026-11-19

DATA 571 does not require you to buy any textbook. The class will not follow one book closely; use these books and notes as references.

Notes from this lab

These notes are free to read online:

- *Machine Learning for Data Science* (lds)[1], the course notes for DATA 571.
- The lab's companion prerequisite notes:
  - *Math for Data Science* (mds), covering linear algebra, calculus, and vector calculus, available at https://morrison-lab.github.io/mds/.
  - *Probability for Data Science* (pds), covering probability theory, random variables, and distributions, available at https://morrison-lab.github.io/pds/.
  - *Statistics for Data Science* (sds), covering estimation, hypothesis testing, and inference, available at https://morrison-lab.github.io/sds/.
- Other notes from the same lab:
  - *Math for Computer Science* (mcs), the lecture notes for CSCI 201, available at https://morrison-lab.github.io/mcs/.
  - *Regression Models for Epidemiology* (rme)[2], the lecture notes for Epidemiology 204 at UC Davis.
  - *Principles of Scientific Writing* (psw), on writing in science, technology, engineering, and mathematics, with a focus on writing about statistical data analysis, available at https://morrison-lab.github.io/psw/.
  - *Principles of Scientific Computing* (psc), on coding for research projects, available at https://morrison-lab.github.io/psc/.
  - *Information Theory for Data Science* (ids), on quantifying uncertainty and information, available at https://morrison-lab.github.io/ids/.
  - *Causal Inference in Epidemiology* (cie), available at https://morrison-lab.github.io/cie/.
  - *What If?* lecture notes (win), on causal inference, available at https://morrison-lab.github.io/win/.
  - *Working with AI* (wai), the lab's notes on working with AI coding agents, available at https://morrison-lab.github.io/wai/.
  - The *UCD-SeRG Lab Manual*, the style guide that the lab's sites follow, available at https://ucd-serg.github.io/lab-manual/.
  - *ai-config*, the lab's portable configuration for AI coding agents, available at https://morrison-lab.github.io/ai-config/.
  - *gha*, the lab's shared GitHub Actions workflows, available at https://morrison-lab.github.io/gha/.
  - *Quarto Website Template* (qwt), the template for starting a new Quarto website, available at https://morrison-lab.github.io/qwt/.

Other books and notes

These books and notes are recommended:

[1] https://morrison-lab.github.io/lds/
[2] https://morrison-lab.github.io/rme/

- *The Elements of Statistical Learning* (2nd ed.) [1], ISBN 0387848576. A PDF can be downloaded at no cost from the authors' webpage[3].
- *An Introduction to Statistical Learning* (2nd ed.) [2]. A PDF can be downloaded at no cost from the authors' webpage[4]. The authors' video course using R is Statistical Learning with R[5]. The 2023 Python edition, *An Introduction to Statistical Learning with Applications in Python* (which adds Jonathan Taylor to James, Witten, Hastie, and Tibshirani), has its own course, Statistical Learning with Python[6]; its Python lab sessions are also collected on their own, as ISLP Python Labs[7]. The Data Science Learning Community[8] has recorded book clubs that read the book chapter by chapter:
  - the R edition[9] [3];
  - the Python edition[10] [4].
- *Tidy Modeling with R*, by Max Kuhn and Julia Silge, teaches the tidymodels framework that the R code in this course's labs uses. It can be read at no cost at tmwr.org[11]. The Data Science Learning Community's book club recordings[12] [5] go through it chapter by chapter.
- *Deep Learning* [6]. The book can be viewed at no cost from the book's webpage[13]. For video lectures on deep learning, see Stanford's CS230, *Deep Learning*[14] (Autumn 2025).
- *Pattern Classification* (2nd ed.) [7], ISBN 0471056693.
- *Machine Learning: A Probabilistic Perspective* [8], ISBN 0262018020.
- *Probabilistic Machine Learning: An Introduction* [9], ISBN 9780262046824 and its sequel, *Probabilistic Machine Learning: Advanced Topics* [10], ISBN 9780262048439. Murphy rewrote his 2012 book as these two volumes, with the first covering foundations, classical methods and deep learning at the level of this course. The author offers free PDFs of both on the books' webpage[15].
- *A Course in Machine Learning* [11], a short first course in the subject. It can be read at no cost at ciml.info[16].
- *Pattern Recognition and Machine Learning* [12], ISBN 0387310738. The book can be viewed at no cost via the author[17].
- *Deep Learning: Foundations and Concepts* [13], ISBN 9783031454677, by Christopher Bishop and Hugh Bishop. A version to read online is free on the book's webpage[18].
- *Machine Learning* [14], ISBN 0070428077, a single-source introduction to the field. A PDF can be downloaded at no cost from the author's webpage[19].
- *Mathematics for Machine Learning* [15], on the mathematical foundations of the field: linear algebra, vector calculus, probability and optimization. The authors keep a PDF available at no cost on the book's webpage[20].
- *Patterns, Predictions, and Actions: Foundations of Machine Learning* [16]. The authors offer a PDF at no cost on the book's webpage[21].
- *Understanding Machine Learning: From Theory to Algorithms* [17], published by Cambridge University Press[22].
- *Foundations of Machine Learning* (2nd ed.) [18]. The book can be downloaded at no cost, as a PDF or in HTML, from the first author's webpage[23].
- *Data Science and Machine Learning: Mathematical and Statistical Methods* [19], ISBN 9781138492530.

[3] https://hastie.su.domains/ElemStatLearn/
[4] https://www.statlearning.com/
[5] https://www.youtube.com/playlist?list=PLoROMvodv4rOzrYsAxzQyHb8n_RWNuS1e
[6] https://www.youtube.com/playlist?list=PLoROMvodv4rPP6braWoRt5UCXYZ71GZIQ
[7] https://www.youtube.com/playlist?list=PLoROMvodv4rNHU1-iPeDRH-J0cL-CrIda
[8] https://www.youtube.com/@dslcvids
[9] https://www.youtube.com/playlist?list=PL3x6DOfs2NGjlhpKMiWsDcKL2nngwXROq
[10] https://www.youtube.com/playlist?list=PL3x6DOfs2NGgbSNh0UG87rrM-z5LiKLZp
[11] https://tmwr.org
[12] https://www.youtube.com/playlist?list=PL3x6DOfs2NGgSt6vIGQWtLwZXS2Q7WZlE
[13] https://www.deeplearningbook.org/
[14] https://www.youtube.com/playlist?list=PLoROMvodv4rNRRGdS0rBbXOUGA0wjdh1X
[15] https://probml.github.io/pml-book/
[16] http://ciml.info/
[17] https://www.microsoft.com/en-us/research/publication/pattern-recognition-machine-learning/
[18] https://www.bishopbook.com/
[19] https://www.cs.cmu.edu/~tom/mlbook.html
[20] https://mml-book.com/
[21] https://mlstory.org/
[22] https://www.cambridge.org/core/books/understanding-machine-learning/3059695661405D25673058E43C8BE2A6
[23] https://cs.nyu.edu/~mohri/mlbook/

The authors offer a PDF of the first edition free for educational use from the book's webpage[24].

- *Hands-On Machine Learning with Scikit-Learn and TensorFlow* [20], ISBN 9781491962299.
- *Machine Learning with PyTorch and Scikit-Learn* [21], ISBN 9781801819312. Code examples and Jupyter notebooks are available from the book's GitHub repository[25].
- *Applied Machine Learning Using mlr3 in R* [22], ISBN 9781032507545. It teaches the practical workflow in R — fitting and evaluating models, tuning hyperparameters, and building pipelines — with the `mlr3` packages, and can be read at no cost on the book's webpage[26].
- *Learning From Data: A Short Course* [23]. More information is available from the book's webpage[27].
- The lecture notes for Stanford's CS229, *Machine Learning* [24], available at no cost from the course webpage[28]. The course's lectures are on YouTube, both the Spring 2026 offering[29] and Andrew Ng's Autumn 2018 offering[30].
- For an optimization reference: *Convex Optimization* [25], ISBN 0521833787, available at no cost from the authors' website[31].

References

[1] T. Hastie, R. Tibshirani, and J. Friedman, *The elements of statistical learning: Data mining, inference, and prediction*, 2nd ed. Springer, 2009. Available: https://hastie.su.domains/ElemStatLearn/

[2] G. James, D. Witten, T. Hastie, and R. Tibshirani, *An introduction to statistical learning with applications in R*, 2nd ed. Springer, 2021. Available: https://www.statlearning.com/

[3] Data Science Learning Community, "Introduction to statistical learning using R (islr06)." Book club meeting recordings on YouTube, 2023. Available: https://www.youtube.com/playlist?list=PL3x6DOfs2NGjlhpKMiWsDcKL2nngwXROq

[4] Data Science Learning Community, "Introduction to statistical learning using Python (islp03)." Book club meeting recordings on YouTube, 2025. Available: https://www.youtube.com/playlist?list=PL3x6DOfs2NGgbSNh0UG87rrM-z5LiKLZp

[5] Data Science Learning Community, "Tidy modeling with R (tmwr05)." Book club meeting recordings on YouTube, 2023. Available: https://www.youtube.com/playlist?list=PL3x6DOfs2NGgSt6vIGQWtLwZXS2Q7WZlE

[6] I. Goodfellow, Y. Bengio, and A. Courville, *Deep learning*. MIT Press, 2016. Available: https://www.deeplearningbook.org/

[7] R. O. Duda, P. E. Hart, and D. G. Stork, *Pattern classification*, 2nd ed. New York: Wiley, 2001.

[8] K. P. Murphy, *Machine learning: A probabilistic perspective*. in Adaptive computation and machine learning. MIT Press, 2012.

[9] K. P. Murphy, *Probabilistic machine learning: An introduction*. in Adaptive computation and machine learning. MIT Press, 2022.

[10] K. P. Murphy, *Probabilistic machine learning: Advanced topics*. in Adaptive computation and machine learning. MIT Press, 2023.

[11] H. Daumé III, *A course in machine learning*. 2017. Available: http://ciml.info/

[12] C. M. Bishop, *Pattern recognition and machine learning*. in Information science and statistics. New York: Springer, 2006.

[13] C. M. Bishop and H. Bishop, *Deep learning: Foundations and concepts*. Springer, 2024. doi: 10.1007/978-3-031-45468-4[32].

[14] T. M. Mitchell, *Machine learning*. in McGraw-hill series in computer science. New York: McGraw-Hill, 1997.

[24] https://people.smp.uq.edu.au/DirkKroese/DSML/
[25] https://github.com/rasbt/machine-learning-book
[26] https://mlr3book.mlr-org.com/
[27] https://amlbook.com/
[28] https://cs229.stanford.edu/
[29] https://www.youtube.com/playlist?list=PLaqpC4kq8Gpw
[30] https://www.youtube.com/playlist?list=PLoROMvodv4rMiGQp3WXShtMGgzqpfVfbU
[31] https://web.stanford.edu/~boyd/cvxbook/
[32] https://doi.org/10.1007/978-3-031-45468-4

[15] M. P. Deisenroth, A. A. Faisal, and C. S. Ong, *Mathematics for machine learning*. Cambridge University Press, 2020. doi: 10.1017/9781108679930[33].

[16] M. Hardt and B. Recht, *Patterns, predictions, and actions: Foundations of machine learning*. Princeton University Press, 2022. Available: https://mlstory.org/

[17] S. Shalev-Shwartz and S. Ben-David, *Understanding machine learning: From theory to algorithms*. Cambridge University Press, 2014. doi: 10.1017/CBO9781107298019[34].

[18] M. Mohri, A. Rostamizadeh, and A. Talwalkar, *Foundations of machine learning*, 2nd ed. MIT Press, 2018. doi: 10.7551/mitpress/10290.001.0001[35].

[19] D. P. Kroese, Z. I. Botev, T. Taimre, and R. Vaisman, *Data science and machine learning: Mathematical and statistical methods*. Boca Raton, FL: Chapman; Hall/CRC, 2019. Available: https://people.smp.uq.edu.au/DirkKroese/DSML/

[20] A. Géron, *Hands-on machine learning with Scikit-Learn and TensorFlow*. O'Reilly Media, 2017.

[21] S. Raschka, Y. (Hayden). Liu, and V. Mirjalili, *Machine learning with PyTorch and Scikit-Learn: Develop machine learning and deep learning models with Python*. Birmingham–Mumbai: Packt Publishing, 2022.

[22] B. Bischl, R. Sonabend, L. Kotthoff, and M. Lang, Eds., *Applied machine learning using mlr3 in R*. Boca Raton, FL: Chapman; Hall/CRC, 2024. doi: 10.1201/9781003402848[36].

[23] Y. S. Abu-Mostafa, M. Magdon-Ismail, and H.-T. Lin, *Learning from data: A short course*. AMLBook, 2012. Available: https://amlbook.com/

[24] T. Ma and A. Ng, "CS229 lecture notes." Stanford University; revised 23 August 2026, 2026. Available: https://cs229.stanford.edu/main_notes.pdf

[25] S. Boyd and L. Vandenberghe, *Convex optimization*. Cambridge University Press, 2004. doi: 10.1017/CBO9780511804441[37].

[33] https://doi.org/10.1017/9781108679930
[34] https://doi.org/10.1017/CBO9781107298019
[35] https://doi.org/10.7551/mitpress/10290.001.0001
[36] https://doi.org/10.1201/9781003402848
[37] https://doi.org/10.1017/CBO9780511804441