

Spring 2026 Booklist

Recommendation: please consult with the course instructor before purchasing any material.

- 1004** Hambley, Allan R., **Electrical Engineering Principles and Applications** (7E), New York: Pearson (2017), ISBN: 9780134484143.

MATLAB (provided with the freshman engineering software package)
Arduino Integrated Development Environment (freely available online)

Laboratory Kits:

Parts kit (given to students courtesy of ECE)

Tool kit (students must purchase. Includes breadboard, tweezers, screwdriver, multimeter)

Digilent Analog Discovery USB oscilloscope kit (owned by ECE and loaned out to students)

- 2024** Hambley, Allan R., **Electrical Engineering Principles and Applications** (7E), New York: Pearson (2017), ISBN: 9780134484143.

Software:

MATLAB (provided with the freshman engineering software package)
Arduino Integrated Development Environment (freely available online)

Laboratory Kits:

Parts kit (given to students courtesy of ECE)

Tool kit (students must purchase. Includes breadboard, tweezers, screwdriver, multimeter)

Digilent Analog Discovery USB oscilloscope kit (owned by ECE and loaned out to students)

- 2054** (Applied Electrical Theory – ME students only)
Allan R. Hambley, **Electrical Engineering Principles and Applications Plus Mastering Engineering with Pearson eText – Access Card Package**, 7th edition, Pearson. ISBN: 9780134712871.

Students can opt to purchase:

Book + Modified Mastering access card: 0134680618

or

*SVE + Modified Mastering access card: 0134680626

or

Modified Mastering access card: 0134487001

*SVE= Student Value Edition which is the loose leaf/ three-hole punched version of the text.

- 2164** J. J. Sellers, **Understanding Space: An Introduction to Astronautics** (3rd Edition), McGraw Hill, 2005. ISBN: 9780077230302.
CROSS LISTED WITH AOE 2664
(ECE teaches Spring 2026)
- 2214** Ellingson, Steven W. **Electromagnetics** (I). i, Blacksburg, VA: VT Publishing, 2018, 225. (Available at: [Electromagnetics, Volume 1](#)) **Author offers free access to this book.**

Neamen, D. A. **Microelectronics Circuit Analysis and Design** 4th edition, New York: McGraw-Hill Education, 2009, 1392. ISBN: 9780073380643.

Required Course Materials:

The Lab-in-A-Box kit was previously used in 1004 and 2024.

Neamen, D. A. **Microelectronics Circuit Analysis and Design**. 4th edition, New York: McGraw-Hill Education, 2009, 1392. ISBN: 9780073380643.

Required Course Materials:

The Lab-in-A-Box kit that was previously used in 1004 and 2024.

2514 **No textbook required**

2544 M. Morris Mano, Charles R. Kime, Tom Martin, **Logic and Computer Design Fundamentals**, 2015. 5th edition, Pearson. ISBN: 9780133760637.

2564 **No textbook required**

2714 B. P. Lathi and Roger Green, **Signal Processing and Linear Systems**, 2nd edition, Oxford University Press (2021), 1152 pages. E-book ISBN: 9780190857691; Print ISBN: 9780190299040

2804 **No textbook required**

3004 Charles K. Alexander and Matthew N. O. Sadiku, **Fundamentals of Electric Circuits**, 7th edition, McGraw-Hill. ISBN: 9781260226409.

3054 Hambley Allan R., **Electrical Engineering Principles and Application** (7E), New York: Pearson (2017), ISBN: 9780134484143.
Students should have from taking 2054.

3074 **No textbook required.** The background information on designing circuits for this course will be provided by the instructor.

Software:

LTspice 24.0.12 or greater (free software provided from Analog Devices, www.analog.com)

3105 Ellingson, Steven W. (2018) **Electromagnetics, Vol. 1**. Blacksburg, VA: VT Publishing. ISBN: 9780997920192.

Free Electronic Book for students: [Electromagnetics, Volume 1](#)

Author offers free access to this book.

Recommended:

Fawwz T. Ulaby, Umberto Ravaioli, **Fundamentals of Applied Electromagnetics**, 8th edition, Pearson. ISBN: 9780135199008.

NOTE: This ISBN is for the Pearson eText access card.

3106 Ellingson, Steven W. (2020) **Electromagnetics, Vol. 2**. Blacksburg, VA: Virginia Tech Publishing. ISBN: 9781949373929

Free Electronic Book for students: [Electromagnetics, Volume 2](#).

Author offers free access to this book.

Recommended:

Fawwz T. Ulaby, Umberto Ravaioli, **Fundamentals of Applied Electromagnetics**, 8th edition, Pearson. ISBN: 9780135199008.

NOTE: This ISBN is for the Pearson eText access card.

3134 Kasap, S.O., **Optoelectronics & Photonics: Principles & Practices**, 2nd Edition, Pearson, 2012, ISBN: 9780132151498.

3204 Razavi, Behzad, **Fundamentals of Microelectronics**, 3rd edition, Wiley, 2021, ISBN: 9781119695141. EBook ISBN: 9781119694397

3214 Donald Neamen, **Semiconductor Physics and Devices**, 4th edition, McGraw-Hill. ISBN: 9780073529585.

3274 **No textbook required.**

Provided: On-line files providing an introduction to the concepts and techniques used in the lab as well as the specifications and deliverables for the lab.

3304 J. D. Glover and M. S. Sarma, **Power System Analysis and Design**, Cengage Engineering, 6th edition. ISBN: 9781305632134.

Robert W. Erikson and Dragan Maksimovic, **Fundamentals of Power Electronics**, 2nd edition, 2001, Springer Science & Business Media, Inc. ISBN: 9780792372707; Digital ISBN: 9780306480485

3354 **No textbook required.** ECE Department, *ECE 3354 Lab Manual*. Available on-line.

3504 Patterson, D., & Hennessey, J. (2020). **Computer Organization and Design RISC-V Edition: The Hardware/Software Interface**, 2nd edition. Morgan Kaufmann Publishers Inc. Pp. 736. ISBN: 9870128203316; eText ISBN: 9780128245583

Required Software:

Architecture simulator as specified by the instructor. There are several simulators available in the public domain at no cost.

3514 Carrano, F. & Henry, T. (2016). **Data abstraction and problem solving with C++: Walls and mirrors**, (7th Edition) London, United Kingdom: Pearson. pp. 864. ISBN: 9780134463971.

3544 John Wakerly, (2017). **Digital Design Principles and Practices**, (5th edition) Pearson. ISBN: 9780134460093.

3564 James F. Kurose and Keith W. Ross, **Computer Networking: A Top-Down Approach**. Pearson. 8th edition, 2021. ISBN: 9780135928615. Electronic Book only. Paper copy available for rental only. ISBN: 9780136681557.

3574 David Thomas and Andrew Hunt. **The Pragmatic Programmer**. Addison-Wesley, 2nd edition. 2020. ISBN: 9780135957059.

Recommended:

Martin, Robert C. (2009). **Clean Code**, Pearson, ISBN:9780132350884.

Hunt, Andrew and Thomas, David, (2000). **The Pragmatic Programmer**. Addison Wesley. ISBN: 9780201616224.

3604 Ellingson, S.W. (2016). **Radio Systems Engineering**, Cambridge University Press, pp. 650. ISBN: 9781107068285.

3614 Grami, Ali (2015). **Introduction to Digital Communications**. Academic Press (Elsevier), pp. 604. ISBN: 9780124076822.

3704 B. P. Lathi and Roger Green, **Signal Processing and Linear Systems**, 2nd edition, Oxford University Press (2021), 1152 pages. E-book ISBN: 9780190857691; Print ISBN: 9780190299040

3714 Nise, Norman S. (2020). **Control Systems Engineering**. 8th Edition, John Wiley and Sons. 800pp. ISBN: 9781119721406.

4110 **No textbook required.**

A lab manual will be provided that describes the theory of the laboratory exercises and also the laboratory procedure.

Recommended:

Quantum engineering fundamentals can be found in the text, Wong, Thomas, **Introduction to Classical and Quantum Computing**, Root Groove, 2022, pp. 382. ISBN: 9798985593105.

Free pdf online:

<https://www.thomaswong.net/introduction-to-classical-and-quantum-computing-1e3p.pdf>

- 4114 Stutzman and Thiele, **Antenna Theory and Design**, 3rd edition, John Wiley. ISBN: 9780470576649; EBook ISBN: 9781118213476.
- 4124 John S. Seybold, **Introduction to RF Propagation**, John Wiley, 1st edition, 2005. ISBN: 9780471655961; eBook ISBN: 9780471743682; Online ISBN:9780471743699
- 4164 **No textbook required.**
P.M. Kintner and M.L. Psiaki., **Global Positioning System Theory and Design** 3rd Edition. **The textbook is provided in electronic format by the instructor. Taught by AOE Spring 2026.**
- 4174 Prölss, G. W., **Physics of the earth's space environment**, 1st Ed. Berlin: Springer, 2004. Pp. xv, 513. ISBN: 9783540214267. **Taught by AOE Spring 2026 (Cross-listed with AOE)**
- 4234 Plummer, James D. and Griffin, Peter B., **Integrated Circuit Fabrication Science and Technology**, 1st edition, 2024, Cambridge University Press, ISBN: 9781009303583.
- 4254 **No textbook required. Co-located with ECE 5224**
- 4364/5374G **No textbook required.**
Instructor provides a free online textbook.
- 4414/CS 4224 **No textbook required. (Cross-listed with CS) Taught by CS Spring 2026**

Optional Books:

- Linux Kernel Development, 3rd Edition, by Robert Love ISBN: 9780672329463.

- Linux Kernel Programming: A comprehensive and practical guide to kernel internals, writing modules, and kernel synchronization , Second Edition, by Kaiwan N. Billimoria ISBN: 9781803232225.

- Linux Device Drivers, 3rd Edition, by Jonathan Corbet, Alessandro Rubini, and Greg Kroah-Hartman ISBN: 9780596005900.

4424/CS4824

(Cross-listed with CS) Taught by CS Spring 2026

No textbook required

4504 John Hennessy and David Patterson, **Computer Architecture: A Quantitative Approach**. Elsevier, 6th edition. 2017. ISBN: 9780128119051. **(Cross-listed with CS) Co-located with ECE/CS 5504. Taught by CS Spring 2026**

4514 No textbook required

4524 Stuart Russell and Peter Norvig, **Artificial Intelligence: A Modern Approach**, 4th Edition, 2020. 1152 pp. Pearson. ISBN: 9780134610993.

4550/5550G

Giorgio C. Buttazzo, **Hard Real-Time Computing Systems: Predictable Scheduling Algorithms and Applications**, 3rd edition, Springer. ISBN: 9781461406754.

4560 Ed Skoudis with Tom Liston, **Counter Hack Reloaded**, 2nd edition, Prentice-Hall. ISBN: 9780131481046.

4564 No cost to students (Full-text available thru VT Library Safari service)

S. Monk, **Programming the Raspberry Pi: Getting Started with Python**, Tab Books, 2012, ISBN 978-0071807838.

B. Rhodes and J. Goerzen, **Foundations of Python Network Programming**, Apress, 3rd ed., 2014, ISBN 978-1430258544.

TJ O'Connor, **Violent Python : A Cookbook for Hackers, Forensic Analysts, Penetration Testers and Security Engineers**, Elsevier/Syngress, 2012, ISBN: 9781597499644.

P. Waher, **Learning Internet of Things**, Packt Publishing, 2015, ISBN: 9781783553532.

Other resources will be available from on-line sites including the Virginia Tech Library's e-book and full-text database offerings.

Each student will receive the following hardware for use during the semester:
Raspberry Pi 3 - Model B
32 GB MicroSD Card
Power Supply with micro-USB Cable

4644 Timothy Pratt and Jeremy Allnut, **Satellite Communications**, 3rd ed., 2020, John Wiley & Sons Ltd. E-book ISBN: 9781119482055, Hardcover ISBN 9781119482178.

4704 **No textbook required.** Consult with the instructor.

4805 & 4806 (Senior Design Project)

Patrick Lencioni, **The 5 Dysfunctions of a Team**, 2010. John Wiley & Sons. ISBN: 9780787960759; eBook ISBN: 9780470893869

4944 **No textbook required.**
Required reference materials will be made available electronically.

5044 **No textbook required.**

Recommended:

Peter Bock, **Getting It Right: R&D Methods for Science and Engineering**, 2nd edition, Academic Press (2019). Paperback ISBN: 9780128161654; eBook ISBN: 9780128161661

5096 Black, Kent, **Test Driven Development**, 1st edition, Addison-Wesley Professional (2002). ISBN: 9780321146533.

Mohan, Gayathri, **Full Stack Testing**, 1st edition, O'Reilly Media (2022), ISBN: 9781098108137.

5114 **No textbook required.**
A lab manual will be provided that describes the theory of the laboratory exercises and also the laboratory procedure.

Recommended:

Quantum engineering fundamentals can be found in the text, Wong, Thomas, **Introduction to Classical and Quantum Computing**, Rooted Groove, 2022, pp. 382. ISBN: 9798985593105.

Free pdf online:

<https://www.thomaswong.net/introduction-to-classical-and-quantum-computing-1e3p.pdf>

5174 **Taught by AOE. Check with instructor.**

F. F. Chen, **Introduction to Plasma Physics and Controlled Fusion**, 3rd edition. Springer. ISBN 9783319223087.
(Cross-listed and taught by AOE)

5184 Sutor, Robert, **Dancing with Qubits**. Packt Publishing. 2019. ISBN: 9781838827366.

5200 **No textbook required. Taught by MSE.**

5205 Dieter K. Schroder, **Semiconductor Material and Device Characterization**, 2006, 3rd edition, John Wiley. ISBN 9780471739067; Online ISBN: 9780471749097

5210 Marc J. Madou, **Fundamentals of Microfabrication and Nanotechnology**. 3rd edition, CRC Press. 2011. ISBN: 9780849331800.

Recommended:

Stephen D. Senturia, **Microsystem Design**, 2nd edition, Springer. ISBN: 9780792372462.

5224 **No textbook required. Co-located with ECE 4254.**

5274 **No textbook required**

Lecture notes provided by the instructor via website, “Modeling and Control of Three-Phase PWM Converters.”

A list of publications related to the subject.

5294 **No textbook required**

Recommended:

K. Sharifabadi, L. Harnefors, H.P. Nee, S. Norrga, R. Teodorescu, “Design, Control, and Application of Modular Multilevel Converters for HVDC Transmission Systems,” IEEE Press, John Wiley & Sons, 2016. ISBN: 978-1118851562

5374G/4364 **No textbook required.**

Instructor provides a free online textbook.

5404 Behzad Razavi.(2016) **Design of Analog CMOS Integrated Circuits**, McGraw Hill. 2nd edition. ISBN: 9780072524932.

Recommended:

Baker, R. Jacob. **CMOS Circuit Design, Layout, and Simulation**, 3rd Edition, Wiley-IEEE Press, 2010, Pp 1072, ISBN 9780470881323.

Provided: Cadence Virtuoso Custom IC Design Tools. Students will also be provided with reading material and papers to read. Paper and Lecture Notes

5414/CS 5264 No textbook required. (Cross-listed with CS) Taught by CS Spring 2026

Optional Books:

- Linux Kernel Development, 3rd Edition, by Robert Love ISBN: 9780672329463.
- Linux Kernel Programming: A comprehensive and practical guide to kernel internals, writing modules, and kernel synchronization , Second Edition, by Kaiwan N. Billimoria ISBN: 9781803232225.
- Linux Device Drivers, 3rd Edition, by Jonathan Corbet, Alessandro Rubini, and Greg Kroah-Hartman ISBN: 9780596005900.

5424 Kevin Murphy, **Machine Learning: A Probabilistic Perspective**, MIT Press, 2012. ISBN: 9780262018029.

5434 Platzner A. (2018). **Logical Foundations of Cyber-Physical Systems**, Springer. ISBN: 9783319635880.

5444 Shanahan, M. (2015). **The Technological Singularity**. Cambridge, MA: MIT Press. Pp. xv, 272. The book is available for free and online from the VT library.

5464 Kelleher, J. Mac Namee, B., & D'Arcy, A. (2020). **Fundamentals of machine learning for predictive data analytics: Algorithms, worked examples, and case studies** (2nd ed.). MIT Press. pp. 856. ISBN: 9780262044691.

5474 **No textbook required.**

Recommended:

Bertsekas, D. and Tsitsiklis, J.N., 1996. Neuro-dynamic programming. Athena Scientific.

Borkar, V.S., 2009. Stochastic approximation: a dynamical systems viewpoint (Vol. 48). Springer.

Lan, G., 2020. First-order and stochastic optimization methods for machine learning (p. 123). New York: Springer.

Martin L. Puterman, Markov Decision Processes: Discrete Stochastic Dynamic Programming, John Wiley & Sons Inc., 1994

Sutton, R.S. and Barto, A.G., 2018. Reinforcement learning: An introduction. MIT press.

5480 Pfleeger, Charles P., Shari Lawrence Pfleeger, and Lizzie Coles-Kemp. 2024. **Security in Computing**. 6th edition. (1040 pages) . Boston: Addison-Wesley Professional. (on-line – MIT only) EBook ISBN: 9780137891252
Available free online:

<https://www.oreilly.com/library/view/-/9780137891375/>.

5484 Null, Linda (2024). **The Essentials of Computer Organization and Architecture**. 6th edition. Burlington, Massachusetts: Jones & Bartlett Learning. Hard copy ISBN: 9781284259438
Free at VT Libraries online ISBN: 9781284259445. [Essentials of Computer Organization and Architecture - Virginia Polytechnic Institute and State University \(exlibrisgroup.com\)](#) (on-line – MIT only)

5494 Poole, D.L. & Mackworth, A.K. (2023). **Artificial intelligence: Foundations of computational agents**, 3rd Edition. Cambridge University Press. Free online for students: <https://artint.info/3e/html/ArtInt3e.html> ISBN: 9781009258197.

5504 **Taught by CS Spring 2026**

John Hennessy and David Patterson, **Computer Architecture: A Quantitative Approach**. Morgan Kaufmann, 6th edition. 2017. ISBN 9780128119051. (Cross-listed with CS and Co-located with ECE/CS 4504).

5544/CS5544 Aho, Lam, Sethi & Ullman, **Compilers: Principles, Techniques, and Tools**. 2nd Edition. Pearson. 2007. 1040pp. ISBN: 9780321486813.

5550G/4550 Giorgio C. Buttazzo, **Hard Real-Time Computing Systems: Predictable Scheduling Algorithms and Applications**, 3rd edition, Springer. ISBN: 9781461406754.

5560/CS5560 CS teaches Spring 2026

William Stallings, **Cryptography and Network Security – Principles and Practices**, 7th edition, Pearson. 2016. ISBN: 9780134444284.

5566/CS5566 **No textbook required**

5580 **No textbook required**

5586 William Stallings; Lawrie Brown, **Computer Security: Principles and Practice**, Pearson, 4th edition. ISBN: 9780134794105. **(On-Line – MIT Only)**

5590/CS5590 CS teaches Spring 2026
No textbook required

5606 **No textbook required. Instructor will provide notes.**

5610 Timothy Pratt and Jeremy Allnut (2020). **Satellite Communications**, 3rd ed., John Wiley & Sons Ltd. E-book ISBN:9781119482055. Hardcover ISBN: 9781119482178.

5620 John G. Proakis and Dimitris G. Manolakis, **Digital Signal Processing: Principles, Algorithms, and Applications**, 5th edition, 2021, Prentice-Hall. eBook ISBN: 9780137348657; Print ISBN: 9780137348244 (2021 update)

5660 **No textbook required**

5664 Nishith Tripathi and Jeffrey H. Reed, **Cellular Communications: A Comprehensive and Practical Guide**, 2014, Wiley-IEEE Press. ISBN: 9780470472071; eBook ISBN: 9781118956519

5714 **(Zoom course – originates Northern VA)** Class notes and papers will be provided.
No textbook required

5764/AOE5764/ME5564 **Taught by ME Spring 2026**
No textbook required. All course materials will be provided by the instructor through course notes.

5806 Patrick Lencioni, **The 5 Dysfunctions of a Team**. John Wiley & Sons. 2010. ISBN: 9780787960759; eBook ISBN: 9780470893869

5864 **No Textbook Required**

5944 **No textbook required**

5984 **SS: Electromag Metamaterials (J. Budhu)**

Tretyakov, S. (2003). **Analytical Modeling in Applied Electromagnetics**. Artech House. ISBN: 9781630812836

Recommended:

Simovski, C., Tretyakov, S. (2020). **An Introduction to Metamaterials and Nanophotonics**. Cambridge University Press. ISBN: 9781108610735 (online) ISBN: 9781108492645 (Hardcover)

5984 **SS: Coding Theory (D. Jakubisin)**
No textbook required

5984 **SS: NextG Mobile Networks (MIT-A. Soysal)**
No textbook required

5984 **SS: Inverter Circuit and Control Implementation (J. Lai)**
No textbook Required. Lecture notes will be provided at no cost to the students.

5984 SS: Power Device Characteriz (L. Zhu)
No Textbook Required

Provided:

F. (Fred) Wang, Z. Zhang, and E. A. Jones, **Characterization of Wide Bandgap Power Semiconductor Devices.** Institution of Engineering and Technology, 2018. doi: 10.1049/pbpo128e.

6154 No textbook required

6204: TS: Uncond Secure Electronics (C. Garcia)
No textbook required

Electronic handouts (without solutions) are provided. Paired with the notes taken during class attendance, the material is sufficient for preparation.

Recommended:

L. B. Kish, **The Kish Cypher: The Story of KLJN for Unconditional Security,** World Scientific 2017. ISBN: 9789814449458

Mark Stamp, **Information Security,** Wiley & Sons, 2006 (Note: There are some errors in it.) ISBN: 9780471744184

Bruce Schneier, **Applied Cryptography,** Wiley & Sons, 1996, 2016
ISBN: 9780471117094

6204: TS: CMOS-Micro/Nano Systems (J. Wang)
No textbook required

Recommended:

1. Sarpeshkar R., **Ultra Low Power Bioelectronics: Fundamentals, Biomedical Applications, and Bio-Inspired Systems.** Cambridge University Press; 2010.
2. Kandel ER, Koester JD, Mack SH, Siegelbaum SA. eds. **Principles of Neural Science,** 6e. McGraw Hill; 2021.
3. Madou, Marc J., **Fundamentals of Microfabrication and Nanotechnology,** Boca Raton, FL: CRC Press, 2012.
4. Wulfram Gerstner, Werner M. Kistler, Richard Naud and Liam Paninski, **Neuronal Dynamics - From Single Neurons to Networks and Models of Cognition,** Cambridge University Press, 2014 (entirely on-line, including Python exercises and video lectures).
5. Mead, C. Analog VLSI and Neural Systems, 1989. Relevant journal papers (IEEE TBioCAS, IEEE JSSC, Nature Electronics, Nature BME, etc.)

6334 No textbook required

6474 No textbook Required

6524 No textbook required

Recommended:

Free for students

Goodfellow, Ian & Bengio, Yoshua and Courville, Aaron. **Deep Learning**, MIT Press, 2016, <http://www.deeplearningbook.org/>. 780 pages.

6604 TS: Optimal Ctrl&Dynamic Progr
No textbook required

Recommended:

1. B. Anderson & J. Moore, Optimal Control: Linear Quadratic Methods
2. B. D. O. Anderson, Optimal Control Applications in Engineering
3. D. Kirk, Optimal Control Theory: An Introduction (theory basics)
4. F. Lewis et al., Optimal Control (engineering applications)
5. J. T. Betts, Practical Methods for Optimal Control and Estimation Using Nonlinear Programming (numerical focus)
6. MATLAB / Python (SciPy, CasADi, GEKKO) tutorials

6724/AOE 6204/ISE 6204 / ME 6204 Taught by AOE Spring 2026
No textbook required

6774 No textbook required. Taught by ISE Spring 2026 (CROSS-LISTED AOE 6774 /ME6574 /ISE6574)

Recommended:

Lavretsky, Eugene & Wise, Kevin. (2013) **Robust and Adaptive Control: With Aerospace Applications**. Springer. ISBN: 9781447143956. The following link goes to the PDF version of the textbook.

<https://link.springer.com/content/pdf/10.1007/978-1-4471-4396-3.pdf>

Khalil, Hassan. (2001). **Nonlinear Systems**, Pearson. 3rd edition. ISBN: 9780130673893.