

FALL 2025 ECE Booklist

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

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

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

- 2214** Ellingson, Steven W. **Electromagnetics** (I). i, Blacksburg, VA: VT Publishing, 2018, 225. (Available at: [Electromagnetics, Volume 1 CC BY-SA 4.0](#).) **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.

- 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** Oppenheim, A. V., Willsky, A. S., and Nawab, S. H. **Signals and Systems**. ii, Pearson, 1996, 1000. ISBN: 9780138147570

- 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.** All required materials will be made available electronically.

- 3105** Ellingson, Steven W. (2018) **Electromagnetics, Vol. 1**. Blacksburg, VA: VT Publishing. ISBN: 9780997920192.
Free Electronic Book for students: <https://doi.org/10.21061/electromagnetics-vol-1> **CC BY-SA 4.0**
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 e-text access card.**

- 3106** Ellingson, Steven W. (2020) **Electromagnetics, Vol. 2**. Blacksburg, VA: Virginia Tech Publishing. ISBN: 9781949373929
Free Electronic Book for students: <https://doi.org/10.21061/electromagnetics-vol-2>. CC BY-SA 4.0
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.**
- 3204** Donald Neamen, **Microelectronics Circuit Analysis and Design**, 4th edition, McGraw-Hill. ISBN: 9780073380643.
- 3214** Donald Neamen, **Semiconductor Physics and Devices**, 4th edition, McGraw-Hill. ISBN: 9780073529585
- 3274** **No textbook required.** ECE Department, **ECE 3274 Lab Manual**. Available on-line.
- 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.
- 3354** **No textbook required.** ECE Department, **ECE 3354 Lab Manual**. Available on-line.
- 3504** Patterson, D., & Hennessey, J. (2013). **Computer Organization and Design: The Hardware/Software Interface**. Morgan Kaufmann Publishers Inc. Pp. 800. ISBN: 9780124077263.
- Required Software:
Architecture simulator as specified by the instructor. There are several simulators available in the public domain at no cost.
- 3514** Carrano and Henry, **Data Abstraction and Problem Solving with C++: Walls and Mirrors**, 7th edition. Pearson. ISBN: 9780134463971.
- 3544** John Wakerly (2017), **Digital Design Principles and Practices**, 5th edition. PEARSON, pp 912. ISBN: 9780134460093.
- 3564** James F. Kurose and Keith W. Ross, **Computer Networking: A Top-Down Approach**. Pearson. 8th edition, 2021. ISBN: 9780135928615.(Was ECE 4614) Electronic Book only. Paper copy available for rental only. ISBN: 9780136681557

- 3574** David Thomas and Andrew Hunt. **The Pragmatic Programmer.** Addison-Wesley, 2nd edition, 2019. 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

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

- 3704** Oppenheim, A. V., Willsky, A. S., and Nawab, S. H. (1996). **Signals and Systems.** Pearson. 2E. pp. 1000. ISBN: 9780138147570

- 4104** Pozar, David M. **Microwave Engineering.** John Wiley. 2011.4th edition. Pp. 752. ISBN: 9780470631553.
(Co-located with 5104G)

- 4120** **No textbook required.** Lecture notes will be used in this course. (co-located with 5124)

Recommended:

Griffiths, D. J., & Schroeter, D. F. (2018). **Introduction to Quantum Mechanics.** Cambridge university press. ISBN: 9781107189638

Recommended:

Hidary, J.D. (2019). **Quantum Computing: An Applied Approach.** Springer, Cham. Print ISBN: 9783030239213; ISBN: 9783030239220

- 4134** Saleh, B. E. A. and Teich, Malvin C. **Fundamentals of Photonics.** 2nd Edition. New York, NY: John Wiley and Sons, 2007, 1177. ISBN: 9780471358329
(Co-located with 5134G)

- 4154** Prolss, G. W., **Physics of The Earth's Space Environment**, (1st Edition), Springer, 2004, 513 pages. ISBN: 9783642059797
(Co-located with 5164 and cross-listed with AOE 4654)

- 4194** W. G. Rees, **Physical Principles of Remote Sensing**, 3rd edition, 2013. Cambridge Univ. Press. ISBN: 9780521181167. (Co-located with 5194)

- 4205** Sergio Franco, **Design with Operational Amplifiers and Analog Integrated Circuits**, McGraw-Hill, 3rd edition, 2005. ISBN: 9780072320848.

- 4220** Behzad Razavi, **Design of Analog CMOS Integrated Circuits**, McGraw-Hill, 2nd edition, 2016. ISBN: 9780072524932.

4224 Robert W. Erikson and Dragan Maksimovic, **Fundamentals of Power Electronics**, 2nd edition, 2001, Springer. ISBN: 9780792372707.

***PDF version available on-line. Free for students. Ask the instructor.**

4324 **No textbook required.**

4334 J. D. Glover and M. S. Sarma, **Power System Analysis and Design**, Cengage Engineering, 6th edition. ISBN: 9781305632134.

4424 **The CS instructor will use these texts Fall 2025:**
No textbook required.

ECE sections will use:

Recommended:

Kevin Murphy, **Probabilistic Machine Learning: An introduction**. MIT Press, 2022. ISBN: 9780262046824.

Marc Deisenroth, **Mathematics for Machine Learning**, 1 Edition. Cambridge University Press, 2020. ISBN: 9781108455145

(Cross-listed with CS 4824)

4520 Laung-Terng Wang, Cheng-Wen Wu and Xiaoqing Wen, **VLSI Test Principles and Architectures**, 1st Ed., 2006. Morgan Kaufmann, ISBN: 9780123705976.
(Co-located with 5505)

Optional:

Niraj Jha and Sandeep Gupta, **Testing of Digital Systems**, Cambridge University Press, 2003. ISBN: 9780521773560.

Miron Abramovici, Melvin A. Greuer, Arthur D. Friedman, **Digital Systems Testing & Testable Design**, 1999, 1st Ed. Wiley- IEEE. ISBN: 9780780310629.

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

4525 Mat Buckland, **Programming Game AI by Example**, Wordware Game Developers Library, 1st Ed. 2004. ISBN: 9781556220784

4534 **No textbook required.**

4540 Weste and Harris, **CMOS VLSI Design: A Circuits and Systems Perspective**, 4th edition, 2010. Pearson. ISBN: 9780321547743. Also available in eText version ISBN: 9780133001471.

- 4554 Richard Szeliski, **Computer Vision: Algorithms and Applications**, 2nd edition, Springer, 2022. ISBN: 9783030343712. (Co-located with 5554)

Available at no cost in a PDF format: <http://szeliski.org/Book/>

- 4560 Easttom, Chuck, **Computer Security Fundamentals**, 5th edition, Pearson. ISBN: 9780137984787.

Offered free online:

<https://learning.oreilly.com/library/view/computer-security-fundamentals/9780137984756/ch01.xhtml>

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

S. Monk, **Programming the Raspberry Pi: Getting Started with Python**, Tab Books, 2012. ISBN: 9780071807838

B. Rhodes and J. Goerzen, **Foundations of Python Network Programming**, Apress, 3rd ed., 2014, ISBN: 9781430258544

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

- 4574 **No textbook required.**

- 4580 R. C. Gonzalez & R. E. Woods, **Digital Image Processing**, 4th edition, PEARSON. ISBN: 9780133356724.

- 4584 **ME teaches. No textbook required. Instructor teaches from Modern Robotics, which is available free online. Fall 25.**

Students will be provided with copies of these workbooks.

- Student Workbook: Robotics Experiment with Serial Robots

- Student Workbook: Programming of Mobile Robots

4624 J. G. Proakis and D. G. Manolakis, **Digital Signal Processing: Principles, Algorithms, and Applications**, 4th edition, PEARSON, 2006. ISBN: 9780131873742.

4634 Ali Grami, **Introduction to Digital Communications**, Academic Press(Elsevier), 1st, 2015. ISBN: 9780124076822.

4664 **No textbook required.**

4805 & 4806 (Senior Design Project)

Patrick Lencioni, **The 5 Dysfunctions of a Team**. John Wiley & Sons. 1st. 2010. ISBN: 9780787960759.

4984 Special Study: IoT System Design-S. Midkiff (co-located 5984 IoT System Design)
No textbook required.

5024 Lathi, B. & Green, R. (2017). **Linear systems and signals** (3rd ed.). Oxford Press. Pp. xv, 1008. ISBN: 9780190200176

5095/CS 5925 Taught by CS Fall 2025

Tsui, Frank, Karam, Orlando, & Bernal, Barbara. **Essentials of Software Engineering**, Jones & Bartlett Learning, 2022, 5th edition. ISBN: 9781284228991

Bass, Len. **Software Architecture in Practice**, Addison-Wesley Professional. 2021. 4th edition. ISBN: 9780136886099

5104G Pozar, David M., **Microwave Engineering**. John Wiley. 2011.4th edition. Pp. 752. ISBN: 9780470631553.

(Co-located with 4104)

5105 Balanis, Constantine A., **Advanced Engineering Electromagnetics**, 2nd Edition, Arizona State University, Wiley. ISBN: 9780470589489

Recommended:

Author offers free access to this book.

Sarabandi, Kamal (2022) **Foundations of Applied Electromagnetics**, The University of Michigan. ISBN 9781607858195

Free Electronic Book for students:

<https://services.publishing.umich.edu/publications/ee/#foundations-applied-electromagnetics>

5124 **No textbook required.** Lecture notes will be used in this course.

Recommended:

Griffiths, D. J., & Schroeter, D. F. (2018). **Introduction to quantum mechanics.** Cambridge university press. ISBN: 9781107189638

Hidary, J.D. (2019). **Quantum Computing: An Applied Approach.** Springer, Cham. Print ISBN 9783030239213 Online ISBN 9783030239220.

5134G Saleh, B. E. A. and Teich, Malvin C. **Fundamentals of Photonics.** 2nd Edition. New York, NY: John Wiley and Sons, 2007, 1177. ISBN: 9780471358329
(Co-located with 4134)

5164 Prolss, G. W., **Physics Of The Earth's Space Environment,** (1st Edition), Springer, 2004, 513 pages. ISBN: 9783642059797
(Co-located with 4154/AOE 4654/AOE 5654)

5194 W. G. Rees, **Physical Principles of Remote Sensing,** 3rd Edition, 2013. Cambridge Univ. Press. ISBN: 9780521181167. (Co-located with 4194)

5234 **No textbook required.**

Recommended:

Henry Ott, **Electromagnetic Compatibility Engineering,** 1st edition, John Wiley. ISBN: 9780470189306.

5254 **No textbook required.**

5354 **No textbook required.**

5424 Kevin Murphy, **Machine Learning: A Probabilistic Perspective,** MIT Press, 2012. 1st Ed. ISBN: 9780262018029.

5440 **No textbook required.**

5480 Pfleeger, Charles P., Shari Lawrence Pfleeger, and Lizzie Coles-Kemp. 2024. **Security in Computing.** Sixth edition. (1040 pages) . Boston: Addison-Wesley Professional. ISBN: 9780137891214 (on-line – MIT only)

Available free online:

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

5484 Null, Linda (2024). **The Essentials of Computer Organization and Architecture.** Sixth 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 \(exlibrisgroup.com\)](https://exlibrisgroup.com/) (on-line – MIT only)

5485 James F. Kurose and Keith W. Ross, **Computer Networking: A Top-Down Approach Featuring the Internet,** Pearson. 7th edition, 2016. ISBN: 9780133594140.

or

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 (**on-line – MIT only**)

5504 **No textbook required.**
Cross-listed with CS 5504

5505 Laung-Terng Wang, Cheng-Wen Wu and Xiaoqing Wen, VLSI Test Principles and Architectures, 1st Ed., 2006. Morgan Kaufmann, ISBN: 9780123705976.
(Co-located with 4520)

Optional:

Niraj Jha and Sandeep Gupta, Testing of Digital Systems, Cambridge University Press, 2003. ISBN: 9780521773560.

Miron Abramovici, Melvin A. Greuer, Arthur D. Friedman, Digital Systems Testing & Testable Design, 1999, 1st Ed. Wiley- IEEE. ISBN: 9780780310629.

5510 **Taught by ECE**
Maurice Herlihy, Nir Shavit, Victor Luchangco, and Michael Spear, The Art of Multiprocessor Programming, Morgan Kauffman, 2E. 2020. ISBN: 9780124159501.
(Cross-listed with CS 5510)

5545 Weste and Harris, CMOS VLSI Design, A Circuits and Systems Perspective, 4th edition, 2004. Pearson. ISBN: 9780321547743.

Recommended:

Tront, Joseph G., PSpice for Basic Microelectronics, McGraw-Hill, 2008.
ISBN: 9780073529479.

5554 Richard Szeliski, Computer Vision: Algorithms and Applications, 2nd edition, Springer, 2022. ISBN: 9783030343712. **(Co-located with 4554)**

Available at no cost in a PDF format: <http://szeliski.org/Book/>

5560/CS 5560

William Stallings, Cryptography and Network Security – Principles and Practices, 8th edition, Pearson, 2019. ISBN: 9780136707226. Digital ISBN: 9780135764268

5565 **Taught by ECE.**
(Cross-listed with CS)

The required textbook is only available online for free:

Larry Peterson and Bruce Davie. Computer Networks; A Systems Approach.
<https://book.systemsapproach.org/>.

Section taught by CS.

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

or

James F. Kurose and Keith W. Ross, **Computer Networking: A Top-Down Approach**. Pearson. 9th edition, 2025 update. Print ISBN: 9780135429334; eTextbook ISBN: 9780135415603

5584 Taught by CS.
No textbook required.

5585 (IT Security & Trust – MIT only)
Easttom, Chuck, **Computer Security Fundamentals**, 5th edition, Pearson.
ISBN: 9780137984787.

Offered free online:

<https://learning.oreilly.com/library/view/computer-security-fundamentals/9780137984756/ch01.xhtml>

5605 Alberto Leon-Garcia, **Probability & Random Processes for Electrical Engineering**, 3rd edition, 2008, Addison-Wesley. ISBN: 9780131471221 **Cross-listed with BMES 5525.**

5635 Mark A. Richards and William L. Melvin, **Principles of Modern Radar, Volume 1: Basic Principles**, 2nd Edition, SciTech Publishing, Raleigh, NC. 1E. 2010, ISBN 9781839533815.

5644 Han, Z., Niyato, D., Saad, W., Başar, T., & Hjørungnes, A. (2012). **Game Theory in Wireless and Communication Networks: Theory, Models, and Applications**. Cambridge, UK. Cambridge University Press. Pp. xv, 554. ISBN: 9780521196963

5674 Jeffrey H. Reed, **Software Radio, A Modern Approach to Radio Design**, 1E, 2002. Prentice-Hall. ISBN: 9780130811585.

5694 No textbook required.

Recommended:

Smith, L.A. (2007) **Chaos: A Very Short Introduction**. OUP. Oxford, UK.

Various papers:

Bayarri, M.J. et al (2015) Probabilistic quantification of hazards, International Journal for Uncertainty Quantification, 5 (4) 297-325
 Berger, J.O. & L.A. Smith (2018) On the statistical formalism of uncertainty quantification, Annual Review of Statistics and Its Application, DOI: 10.1146/annurev-statistics-030718-105232.
 Good, I.J. (1959) "Kinds of probability," Science, vol. 129 pp. 443-447.
 Hagedorn, R. & L.A. Smith (2009) Communicating the value of probabilistic forecasts with weather roulette, Meteorol. Appl., 16 (2): 143-155.
 Judd, K., C.A. Reynolds, T.E. Rosmond & L.A. Smith (2008) The Geometry of Model Error, J. Atmos. Sci., 65 (6): 1749-1772.
 Judd, K. & L.A. Smith (2004) Indistinguishable States II: The Imperfect Model Scenario, Physica D, 196: 224-242.
 Thompson, E.L. and Smith, L.A. (2019) Escape from model-land. Economics Discussion Papers, No 2019-23, Kiel Institute for the World Economy.

5704 Taught by ME. Check with instructor.
No textbook required.

5744 Wilson J. Rugh, **Linear Systems Theory**, 2nd edition, Prentice-Hall. ISBN: 9780134412054.
(Cross-listed with ME and AOE)

5754 Taught by ME. Check with instructor.

Williams and Lawrence, **Linear State-Space Control Systems**, 1st edition, 2007. John Wiley. **(Cross-listed with ME and AOE) ME teaches -Fall 2025. Book available for free in pdf format. See professor for link.**

5774 H. Kahlil, **Nonlinear Systems**, 3rd edition. Pearson. 2002. ISBN: 9780130673893.
AOE teaches- Fall 2025. (Cross-listed with ME and AOE)

5944 No textbook required

5984 Special Study: 5-G Advanced, O-RAN, and 6G-N. Tripathi/J. Reed
No textbook required.

5984 Special Study: IoT System Design-S. Midkiff (co-located 4984 IoT System Design)
No textbook required.

5984 Special Study: Critical Eng of Emerging Tech (MIT)- K. Giles
No textbook required.

5984 Special Study: Data Engineering Project (MIT)- N. Tryfona
No textbook required.

- 5984 **Special Study: AIML-MIMO-NxtGenWireless- L. Liu**
No textbook required.
- 5984 **Special Study: Industry Topics and Professionalism- R. Ragunathan**
No textbook required.
- 5984 **Special Study: Engineer Entrepreneurship- A. Stavrou**
No textbook required.
- 6354 P. W. Sauer and M. A. Pai, **Power System Dynamics and Stability**. Wiley-IEEE Press;
2 edition (September 25, 2017). ISBN: 9781119355779
- 6504 **TS: Perf Opt of NextG and Spect- T. Hou**
No textbook required. Reference materials to be distributed by the instructor.
- 6514 **No textbook required.**
- 6554 **No textbook required.**