Software Engineering / Full-Stack

* University of Helsinki. (n.d.). *Full Stack open*.
* [https://fullstackopen.com](https://fullstackopen.com/)
* Harvard University. (n.d.). *CS50’s Web Programming with Python and JavaScript*.
* <https://cs50.harvard.edu/web/>
* Codevolution. (n.d.). *YouTube Channel Codevolution*.
* <https://www.youtube.com/@Codevolution>
* Haverbeke, M. (n.d.). *Eloquent JavaScript*.
* <https://eloquentjavascript.net/>

Computer Science

* Nisan, N., & Schocken, S. (n.d.). *Nand2Tetris: Building a Modern Computer from First Principles*.
* <https://www.nand2tetris.org/>
* Practical Tutorials. (n.d.). *Project-Based Learning Repository* [GitHub repository].
* <https://github.com/practical-tutorials/project-based-learning>
* Massachusetts Institute of Technology. (2013). *9.04 Sensory Systems (Fall 2013)* [OpenCourseWare].
* <https://ocw.mit.edu/courses/9-04-sensory-systems-fall-2013/>
* Harvard University. (n.d.). *Statistics 110: Probability*.
* <https://projects.iq.harvard.edu/stat110/home>
* [Coursera – Understanding the Brain](https://www.coursera.org/learn/neurobiology)
* – Free course covering neurobiology foundations.
* [Open Textbook Library – Introduction to Neuroscience](https://open.umn.edu/opentextbooks/textbooks/1303)
* – Free college-level textbook for core concepts.
* [MIT OCW – Introduction to Neuroscience](https://ocw.mit.edu/courses/9-01-introduction-to-neuroscience-fall-2007/)
* – MIT’s lecture series and problem sets.
* [Open Neuroscience Initiative](https://via.library.depaul.edu/cshtextbooks/2/)
* – Open academic textbook for neuroscience.
* [YouTube – Neural Science for Engineers](https://www.youtube.com/watch?v=aircAruvnKk)
* – Engineering-focused neuroscience video playlist.
* [Coursera – Neurobiology and Behavior](https://www.coursera.org/learn/neurobiology)
* – Course modules on neural signaling (search for archives/playlists).
* [Learn Medical Neuroscience – Study Tips Sensory Systems](https://www.learnmedicalneuroscience.nl/study-tips-sensory-systems/)
* – Study guides and self-assessment for sensory systems.
* [BioEd Online – The Motor System Teacher's Guide](https://www.bioedonline.org/lessons-and-more/teacher-guides/motor-system/)
* – Motor system teaching guide and worksheets.
* [Fun & Function – Sensory-Motor Guide](https://funandfunction.com/media/wysiwyg/uploads/Activity_Guide-Jan2019web_1_.pdf)
* – Activity guide for sensory-motor systems.
* [Simply Neuroscience – Resources](https://www.simplyneuroscience.org/resources)
* – Extensive open-access neuroscience study materials and worksheets.
* [Free Neuroscience MOOCs](https://neurosciencenews.com/free-neuroscience-moocs/)
* – Curated list of free, open neuroscience courses (Harvard, Coursera, etc.).
* [Alison – Free Online Neuroscience Courses](https://alison.com/tag/neuroscience)
* – Multiple self-paced neuroscience modules.
* [Strategic Leadership Institute – Free Neuroscience Resources](https://www.stratleader.net/neuroscience-resources)
* – Academic papers, podcasts, open content.
* [YouTube – Neural Science for Engineers](https://www.youtube.com/watch?v=aircAruvnKk)
* – Neural engineering video series.

Youtube Playlists

<https://www.youtube.com/playlist?list=PLB1273C507BDE28DC> physical chem I- MIT

<https://www.youtube.com/playlist?list=PLYHaXvNA5JrevMbLhoazFQbDdw8pfCm-O> physical chem II-Quantum Mechanics and Spectroscopy

[Professor Derricotte](https://www.youtube.com/@ProfessorDerricotte)

<https://www.youtube.com/playlist?list=PLUl4u3cNGP62RsEHXe48Imi9-87FzQaJg> MIT 5.61 Physical Chemistry, Fall 2017

[MIT OpenCourseWare](https://www.youtube.com/@mitocw)

<https://www.youtube.com/playlist?list=PLYHaXvNA5Jrf_z0xbYhlzv0leoGBXHhll> Physical Chemistry I - Chemical Thermodynamics

[Professor Derricotte](https://www.youtube.com/@ProfessorDerricotte)

<https://www.youtube.com/playlist?list=PLd-0K-8ZyM0WdLse-OASmbqzXdpJcCn3P> Thermodynamics

[Less Boring Lectures](https://www.youtube.com/@LessBoringLectures)

<https://www.youtube.com/playlist?list=PLOBajja3EcWKh2FzR0KiGQCKkpjN9FpLV> **Thermodynamics**



[by Engineering Deciphered](https://www.youtube.com/@engineeringdeciphered)

<https://www.youtube.com/playlist?list=PLA62087102CC93765>

[[A person standing in front of a chalkboard

AI-generated content may be incorrect.](https://www.youtube.com/watch?v=kLqduWF6GXE&list=PLA62087102CC93765&pp=iAQB)](https://www.youtube.com/watch?v=kLqduWF6GXE&list=PLA62087102CC93765&pp=iAQB)

[Play all](https://www.youtube.com/watch?v=kLqduWF6GXE&list=PLA62087102CC93765&pp=iAQB)

MIT 5.60 Thermodynamics & Kinetics, Spring 2008

[MIT OpenCourseWare](https://www.youtube.com/@mitocw)

<https://www.youtube.com/playlist?list=PLUl4u3cNGP63LOmB3_O0xbgZVZibxj4rb> MIT 5.111 Principles of Chemical Science, Fall 2014

[MIT OpenCourseWare](https://www.youtube.com/@mitocw)

<https://www.youtube.com/playlist?list=PLybg94GvOJ9GlYQJWEhxOBtNXH5DKeNsN> **Inorganic/Organometallic Chemistry**



[by Professor Dave Explains](https://www.youtube.com/@ProfessorDaveExplains)

<https://www.youtube.com/playlist?list=PLgDm_hcCyvqtfBKa4mOuIifYkv52kxsqW> Biochemistry 2

[Yousef Yousri](https://www.youtube.com/@YousefYousri-le3fx)

<https://www.youtube.com/playlist?list=PL5rTEahBdxV6prB_iWNU8N2-L5XAktld8> **Biochemistry & Genetics**



[by Dirty Medicine](https://www.youtube.com/@DirtyMedicine)

<https://www.youtube.com/playlist?list=PLUl4u3cNGP62wNcIMfinU64CAfreShjpt> (Selected Lectures) MIT 7.05 General Biochemistry, Spring 2020

[MIT OpenCourseWare](https://www.youtube.com/@mitocw)

<https://www.youtube.com/playlist?list=PLB572BA3ED0F700F1>

[[A person in a classroom with a large screen

AI-generated content may be incorrect.](https://www.youtube.com/watch?v=5sLb4DS0LM8&list=PLB572BA3ED0F700F1&pp=iAQB)](https://www.youtube.com/watch?v=5sLb4DS0LM8&list=PLB572BA3ED0F700F1&pp=iAQB)

[Play all](https://www.youtube.com/watch?v=5sLb4DS0LM8&list=PLB572BA3ED0F700F1&pp=iAQB)

Freshman Organic Chemistry II with Michael McBride

[YaleCourses](https://www.youtube.com/@YaleCourses)

<https://www.youtube.com/playlist?list=PLDea8VeK4MUTppAXQzHBNz3KiyEd9SQms> Numerical Analysis Course

[StudySession](https://www.youtube.com/@StudySessionYT)

<https://www.youtube.com/playlist?list=PLdgVBOaXkb9Ab7UM8sCfQWgdbzxkXTNVD> Partial Differential Equations

[Faculty of Khan](https://www.youtube.com/@FacultyofKhan)

<https://www.youtube.com/playlist?list=PLMrJAkhIeNNQromC4WswpU1krLOq5Ro6S>

[[A person standing in front of a blackboard

AI-generated content may be incorrect.](https://www.youtube.com/watch?v=Jt5R-Tm8cV8&list=PLMrJAkhIeNNQromC4WswpU1krLOq5Ro6S&pp=iAQB)](https://www.youtube.com/watch?v=Jt5R-Tm8cV8&list=PLMrJAkhIeNNQromC4WswpU1krLOq5Ro6S&pp=iAQB)

[Play all](https://www.youtube.com/watch?v=Jt5R-Tm8cV8&list=PLMrJAkhIeNNQromC4WswpU1krLOq5Ro6S&pp=iAQB)

Engineering Math: Vector Calculus and Partial Differential Equations

[Steve Brunton](https://www.youtube.com/@Eigensteve)

<https://www.youtube.com/playlist?list=PLF6061160B55B0203> Partial Differential Equations

[commutant](https://www.youtube.com/@commutant)

<https://www.youtube.com/playlist?list=PLy8CVak7-Br5zGIVL-gaZxnR9ojM3GxNA> Partial Differential Equations

[commutant](https://www.youtube.com/@commutant)

<https://www.youtube.com/playlist?list=PLEC88901EBADDD980> **MIT 18.03 Differential Equations, Spring 2006**



[by MIT OpenCourseWare](https://www.youtube.com/@mitocw)

<https://www.youtube.com/playlist?list=PLUl4u3cNGP61MdtwGTqZA0MreSaDybji8>

[[A person writing on a chalkboard

AI-generated content may be incorrect.](https://www.youtube.com/watch?v=j9WZyLZCBzs&list=PLUl4u3cNGP61MdtwGTqZA0MreSaDybji8&pp=iAQB)](https://www.youtube.com/watch?v=j9WZyLZCBzs&list=PLUl4u3cNGP61MdtwGTqZA0MreSaDybji8&pp=iAQB)

6.041 Probabilistic Systems Analysis and Applied Probability

[MIT OpenCourseWare](https://www.youtube.com/@mitocw)

<https://www.youtube.com/playlist?list=PLUl4u3cNGP60hI9ATjSFgLZpbNJ7myAg6> MIT RES.6-012 Introduction to Probability, Spring 2018

[MIT OpenCourseWare](https://www.youtube.com/@mitocw)

<https://www.youtube.com/playlist?list=PLMrJAkhIeNNR3sNYvfgiKgcStwuPSts9V> Probability Bootcamp

[Steve Brunton](https://www.youtube.com/@Eigensteve)

<https://www.youtube.com/playlist?list=PL-VBs-MiT7rO0mBGFCDZlXDAfv0hogq0y> **Logic and Proofs**

[by Discrete Math videos](https://www.youtube.com/@discretemathvideos204)

<https://www.youtube.com/playlist?list=PL49CF3715CB9EF31D->

<https://www.youtube.com/playlist?list=PL221E2BBF13BECF6C> MIT 18.06SC Linear Algebra, Fall 2011

[MIT OpenCourseWare](https://www.youtube.com/@mitocw)

<https://www.youtube.com/playlist?list=PLHXZ9OQGMqxfUl0tcqPNTJsb7R6BqSLo6> Linear Algebra (Full Course)

[Dr. Trefor Bazet](https://www.youtube.com/@DrTrefor)

<https://www.youtube.com/playlist?list=PLUl4u3cNGP63oMNUHXqIUcrkS2PivhN3k>

[[A person in front of a chalkboard

AI-generated content may be incorrect.](https://www.youtube.com/watch?v=Cx5Z-OslNWE&list=PLUl4u3cNGP63oMNUHXqIUcrkS2PivhN3k&pp=iAQB)](https://www.youtube.com/watch?v=Cx5Z-OslNWE&list=PLUl4u3cNGP63oMNUHXqIUcrkS2PivhN3k&pp=iAQB)

[Play all](https://www.youtube.com/watch?v=Cx5Z-OslNWE&list=PLUl4u3cNGP63oMNUHXqIUcrkS2PivhN3k&pp=iAQB)

MIT 18.065 Matrix Methods in Data Analysis, Signal Processing, and Machine Learning, Spring 2018

[MIT OpenCourseWare](https://www.youtube.com/@mitocw)

<https://www.youtube.com/playlist?list=PLeefXVKiX48rcnK0TentV2rXrQoIhuqpy> **PEC303:Biomedical Signal Processing**

[by Course on Biomedical Signal Processing](https://www.youtube.com/@courseonbiomedicalsignalpr4067)

<https://www.youtube.com/playlist?list=PL6Q1zmN6V-zF3gWS1aXIX7fT5oMnmCyRV> **Neural signal processing and analysis: Zero to hero**

[by grzegorz gwardys](https://www.youtube.com/@alamakotayo555)

<https://www.youtube.com/playlist?list=PLVsrfTSlZ_42TbmQUmidUJaiRF8D34zQL>

Neural Networks

[ENGINEERING TUTORIAL](https://www.youtube.com/@ENGINEERINGTUTORIAL2468)

<https://www.youtube.com/playlist?list=PLX-XEf1yTMrnjFt30RQ7X6k-dfhL1fIGq>

Nengo and the Neural Engineering Framework

[terrencecstewart](https://www.youtube.com/@terrencecstewart)

<https://www.youtube.com/playlist?list=PLAE4A9DB84AC5F823> **Biomedical Engineering Stanford course**

[by thewakeboarder](https://www.youtube.com/@thewakakeboarder)

<https://www.youtube.com/playlist?list=PLtdr2qSB8H94jFZJUwk99gPgK2Utv8RR1> **Stanford Neuroscience Course**

[by Andrew Sav](https://www.youtube.com/@andrewsav4865)

<https://www.youtube.com/playlist?list=PL-gZOJYtyiEaPcGJO63zFLWDc1Ft4WadG> **Intro to Neuroscience**

[by Sara K](https://www.youtube.com/@sarak1300)

<https://www.youtube.com/playlist?list=PLCHBxApHO4-I8ahFS0dflGURuXnT7PNtV>

Introduction to Neuroscience

[Alex Reynolds, PhD](https://www.youtube.com/@AlexReynoldsPhD)

<https://www.youtube.com/playlist?list=PLBlnK6fEyqRgLLlzdgiTUKULKJPYc0A4q> Computer Organization & Architecture (COA)

[Neso Academ](https://www.youtube.com/@nesoacademy)

<https://www.youtube.com/playlist?list=PL5Q2soXY2Zi9Eo29LMgKVcaydS7V1zZW3> Livestream - Digital Design and Computer Architecture - ETH Zürich (Spring 2025)

[Onur Mutlu Lectures](https://www.youtube.com/@OnurMutluLectures)

<https://www.youtube.com/playlist?list=PLW1yb8L3S1ngGmtKlI5XYcTNQQ1r3xZvq> Fundamentals of Operating Systems

[Mitch Davis](https://www.youtube.com/@jams4dad_ITPro)

<https://www.youtube.com/playlist?list=PLB7540DEDD482705B>

MIT 6.042J Mathematics for Computer Science, Fall 2010

[MIT OpenCourseWare](https://www.youtube.com/@mitocw)

<https://www.youtube.com/playlist?list=PLBlnK6fEyqRhqJPDXcvYlLfXPh37L89g3> Discrete Mathematics

[Neso Academy](https://www.youtube.com/@nesoacademy)

<https://www.youtube.com/playlist?list=PLBlnK6fEyqRjT3oJxFXRgjPNzeS-LFY-q>

Compiler Design

[Neso Academy](https://www.youtube.com/@nesoacademy)

<https://www.youtube.com/playlist?list=PLB7540DEDD482705B>

MIT 6.042J Mathematics for Computer Science, Fall 2010

[MIT OpenCourseWare](https://www.youtube.com/@mitocw)

<https://www.youtube.com/playlist?list=PLBlnK6fEyqRhqJPDXcvYlLfXPh37L89g3> Discrete Mathematics

[Neso Academy](https://www.youtube.com/@nesoacademy)

<https://www.youtube.com/playlist?list=PLBlnK6fEyqRjT3oJxFXRgjPNzeS-LFY-q>

Compiler Design

[Neso Academ](https://www.youtube.com/@nesoacademy)

<https://www.youtube.com/playlist?list=PLWPirh4EWFpHr_1ZCkuF9ToYUrmujv9Aa>

Signals and Systems

[TutorialsPoint](https://www.youtube.com/@TutorialsPoint_)

<https://www.youtube.com/playlist?list=PLgwJf8NK-2e54DNmA5iHqPfK9y-7SPFGy> **Signals and Systems**

[by Engineering Funda](https://www.youtube.com/@EngineeringFunda)

<https://www.youtube.com/playlist?list=PLBlnK6fEyqRhG6s3jYIU48CqsT5cyiDTO>

Signals and Systems

[Neso Academy](https://www.youtube.com/@nesoacademy)

<https://www.youtube.com/playlist?list=PLvgLolfaRAWdMQxSlGTwIRAFg_qHOZMW4> **Electric Circuits II**

[by Saher Albatran](https://www.youtube.com/@saheralbatran8118)

Here are some **free and highly informative online books** for your requested areas:

## **Electrical Engineering**

* [Electrical Engineering Textbooks - Open Textbook Library](https://open.umn.edu/opentextbooks/subjects/electrical)
* [Textbook for Electrical Engineering & Electronics - All About Circuits](https://www.allaboutcircuits.com/textbook/)
* [Electrical Engineering - Free Books at EBD](https://www.e-booksdirectory.com/listing.php?category=105)
* [Fundamentals of Electrical Engineering I (Rice University)](https://elec241.rice.edu/)
* [Basic Electrical Engineering - GRIET](https://www.griet.ac.in/nodes/BEEE.pdf)
* [Electrical Engineering 101 (Darren Ashby)](https://www.amazon.com/Electrical-Engineering-101-Everything-Probably/dp/0123860016)

## **Biomedical Engineering**

* [Biomedical Engineering – From Theory to Applications (IntechOpen)](https://www.intechopen.com/books/2241)
* [Introduction to Biomedical Engineering (Enderle & Bronzino)](https://shop.elsevier.com/books/introduction-to-biomedical-engineering/enderle/978-0-12-374979-6)
* [The Biomedical Engineering Handbook (Bronzino)](https://biblioseb.files.wordpress.com/2018/03/biomedical-engineering-handbook-j-d-bronzino.pdf)
* [Biomedical Engineering and Design Handbook](https://www.accessengineeringlibrary.com/content/book/9780071356374)
* [Books & eBooks - Biomedical Engineering - UC Davis](https://guides.library.ucdavis.edu/biomedical-engineering/books-eBooks)
* [e-Books - Biomedical Engineering - Stony Brook](https://guides.library.stonybrook.edu/c.php?g=35533&p=1162082)

## **Signals and Systems**

* [Signals and Systems - Michael Adams (University of Victoria)](https://www.ece.uvic.ca/~mdadams/sigsysbook/)
* [Signals & Systems - Oppenheim (PDF)](https://www.cedric-richard.fr/assets/files/Signals_and_Systems_2nd_Edition_by_Oppen.pdf)
* [Signals-and-systems, Schaums Outline, Hwei Hsu (PDF)](https://electronicsbookcafe.files.wordpress.com/2015/08/signals-and-systems-2nd-edition-schaums-outline-series-hwei-hsu.pdf)
* [Signals and Systems (Simon Haykin)](https://studentshubblog.files.wordpress.com/2014/12/signals-and-systems-simon-haykin.pdf)

## **Advanced Organic Chemistry**

* [Organic Chemistry, OpenStax](https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Organic_Chemistry_(OpenStax))
* [Organic Chemistry with a Biological Emphasis](https://open.umn.edu/opentextbooks/textbooks/organic-chemistry-with-a-biological-emphasis-volume-i)

## **Biochemistry**

* [Biochemistry Free for All](https://biochem.oregonstate.edu/undergraduate/educational-resources)
* [Biochemistry, OpenStax](https://conncoll.libguides.com/OER/ChemistryBiochemistry)
* [Principles of Biochemistry](https://biochem.oregonstate.edu/undergraduate/educational-resources)
* [Biochemical Methods](https://www.macmillanlearning.com/college/us/discipline/Biochemistry)

## **Thermodynamics**

* [Thermodynamics and Chemistry](https://www.khanacademy.org/science/ap-chemistry-beta/x2eef969c74e0d802:thermodynamics)
* [Thermodynamics, OpenStax](https://openstax.org/books/college-physics-2e/pages/15-introduction-to-thermodynamics)
* [Engineering Thermodynamics - Wikibooks](https://en.wikibooks.org/wiki/Wikibooks:Physics_bookshelf)

## **Physical Chemistry**

* [Physical Chemistry - LibreTexts](https://adapt.libretexts.org/courses/672/anonymous)
* [Physical Chemistry](https://www.nsf.gov/focus-areas/chemistry/educational-resources)
* [Chemistry LibreTexts](https://chem.libretexts.org/)

## **Neuroscience/Neural Engineering**

* [Neuroscience Online (UT Health Science Center Houston)](https://nba.uth.tmc.edu/neuroscience/)
* [Neural Engineering (MIT OpenCourseWare)](https://ocw.mit.edu/courses/9-40-introduction-to-neural-computation-spring-2018/)
* [Computational Neuroscience Textbook](https://neural-reckoning.org/comp-neuro-resources.html)
* Principles of Neural Science (older editions often public domain/search for PDFs)

1. <https://open.umn.edu/opentextbooks/subjects/electrical>
2. <https://www.allaboutcircuits.com/textbook/>
3. [https://fet.engin.umich.edu](https://fet.engin.umich.edu/)
4. <https://www.pce-fet.com/common/library/books/39/173_BasicElectricalEngineeringbyV.K.MehtaandRohitMehta.pdf>
5. <https://www.e-booksdirectory.com/listing.php?category=105>
6. <https://dl.icdst.org/pdfs/files3/24f01adfd2f831d207dc8b47a9f98ea6.pdf>
7. <https://www.ece.uvic.ca/~mdadams/sigsysbook/>
8. <https://theswissbay.ch/pdf/Gentoomen%20Library/Electronics/Electrical%20Engineering%20101%20%5Bby%20Darren%20Ashby%5D.pdf>
9. <https://biblioseb.files.wordpress.com/2018/03/introduction-to-biomedical-engineering-john-d-enderle-et-al.pdf>
10. <https://www.cedric-richard.fr/assets/files/Signals_and_Systems_2nd_Edition_by_Oppen.pdf>
11. <https://www.ece.rice.edu/~dhj/courses/elec241/col10040.pdf>
12. <https://guides.library.ucdavis.edu/biomedical-engineering/books-eBooks>
13. <https://www.ec-undp-electoralassistance.org/default.aspx/threads/a1gDrO/Signals-And-Systems-Oppenheim.pdf>
14. <https://www.griet.ac.in/nodes/BEEE.pdf>
15. <https://engineeranddoctor.weebly.com/uploads/2/1/2/7/21272264/biomedical_engineering__and_design_handbook_vol-1.pdf>
16. <https://electronicsbookcafe.files.wordpress.com/2015/08/signals-and-systems-2nd-edition-schaums-outline-series-hwei-hsu.pdf>
17. <https://cut-za.libguides.com/c.php?g=1305792&p=10595181>
18. <https://biblioseb.files.wordpress.com/2018/03/biomedical-engineering-handbook-j-d-bronzino.pdf>
19. <https://studentshubblog.files.wordpress.com/2014/12/signals-and-systems-simon-haykin.pdf>
20. <https://guides.library.stonybrook.edu/c.php?g=35533&p=1162082>
21. <https://www.amazon.com/Electrical-Engineering-101-Everything-Probably/dp/0123860016>
22. <https://www.intechopen.com/books/2241>
23. <https://shop.elsevier.com/books/introduction-to-biomedical-engineering/enderle/978-0-12-374979-6>
24. [https://elec241.rice.edu](https://elec241.rice.edu/)
25. <https://www.accessengineeringlibrary.com/content/book/9780071356374>
26. <https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Organic_Chemistry_(OpenStax)>
27. <https://open.umn.edu/opentextbooks/textbooks/organic-chemistry-with-a-biological-emphasis-volume-i>
28. <https://conncoll.libguides.com/OER/ChemistryBiochemistry>
29. <https://biochem.oregonstate.edu/undergraduate/educational-resources>
30. <https://www.khanacademy.org/science/ap-chemistry-beta/x2eef969c74e0d802:thermodynamics>
31. <https://openstax.org/books/college-physics-2e/pages/15-introduction-to-thermodynamics>
32. <https://www.macmillanlearning.com/college/us/discipline/Biochemistry>
33. <https://en.wikibooks.org/wiki/Wikibooks:Physics_bookshelf>
34. <https://adapt.libretexts.org/courses/672/anonymous>
35. [https://chem.libretexts.org](https://chem.libretexts.org/)
36. <https://www.nsf.gov/focus-areas/chemistry/educational-resources>
37. <https://nba.uth.tmc.edu/neuroscience/>
38. <https://neural-reckoning.org/comp-neuro-resources.html>
39. <https://users.ece.cmu.edu/~byronyu/papers/PNS-6thEdition-SectionV-Motor-Chapter39-BMIs.pdf>
40. <https://ocw.mit.edu/courses/9-40-introduction-to-neural-computation-spring-2018/>

# Study Links Database

| \*\*Subject/Course\*\* | \*\*Institution/Instructor\*\* | \*\*Link\*\* |

|--------------------|----------------------------|----------|

| \*\*Physical Chemistry\*\* | MIT 5.60 | [Physical Chemistry](https://www.youtube.com/playlist?list=PLB1273C507BDE28DC) |

| \*\*Physical Chemistry II\*\* | MIT 5.61 | [Physical Chemistry II - Quantum Mechanics and Spectroscopy](https://www.youtube.com/playlist?list=PLYHaXvNA5JrevMbLhoazFQbDdw8pfCm-O) |

| \*\*Physical Chemistry\*\* | MIT 5.61 (Fall 2017) | [MIT 5.61 Physical Chemistry, Fall 2017](https://www.youtube.com/playlist?list=PLUl4u3cNGP62RsEHXe48Imi9-87FzQaJg) |

| \*\*Signals and Systems\*\* | NPTEL | [Signals and Systems](https://www.youtube.com/playlist?list=PLYHaXvNA5Jrf\_z0xbYhlzv0leoGBXHhll) |

| \*\*Pattern Recognition\*\* | NPTEL (IIT Madras) | [Pattern Recognition](https://www.youtube.com/playlist?list=PLd-0K-8ZyM0WdLse-OASmbqzXdpJcCn3P) |

| \*\*Machine Learning\*\* | Stanford CS229 (Andrew Ng) | [Machine Learning Course](https://www.youtube.com/playlist?list=PLA62087102CC93765) |

| \*\*Intro to CS (Python)\*\* | MIT 6.0001 (Ana Bell) | [Intro to CS and Programming](https://www.youtube.com/playlist?list=PLUl4u3cNGP62wNcIMfinU64CAfreShjpt) |

| \*\*Deep Learning\*\* | NPTEL | [Deep Learning](https://www.youtube.com/playlist?list=PL5rTEahBdxV6prB\_iWNU8N2-L5XAktld8) |

| \*\*PDEs\*\* | Faculty of Khan | [Partial Differential Equations](https://www.youtube.com/playlist?list=PLdgVBOaXkb9Ab7UM8sCfQWgdbzxkXTNVD) |

| \*\*Differential Equations\*\* | MIT 18.03 (Arthur Mattuck) | [Differential Equations](https://www.youtube.com/playlist?list=PLEC88901EBADDD980) |

| \*\*Calculus (Single)\*\* | MIT 18.01 | [Single Variable Calculus](https://www.youtube.com/playlist?list=PLUl4u3cNGP61MdtwGTqZA0MreSaDybji8) |

| \*\*Calculus (Multi)\*\* | MIT 18.02 (Denis Auroux) | [Multivariable Calculus](https://www.youtube.com/playlist?list=PLUl4u3cNGP60hI9ATjSFgLZpbNJ7myAg6) |

| \*\*Linear Algebra\*\* | MIT 18.06 (Gilbert Strang) | [Linear Algebra](https://www.youtube.com/playlist?list=PL49CF3715CB9EF31D) |

| \*\*Linear Algebra (Scholar)\*\* | MIT 18.06SC | [Linear Algebra Scholar Ed.](https://www.youtube.com/playlist?list=PL221E2BBF13BECF6C) |

| \*\*Linear Algebra (Visual)\*\* | 3Blue1Brown | [Essence of Linear Algebra](https://www.youtube.com/playlist?list=PLHXZ9OQGMqxfUl0tcqPNTJsb7R6BqSLo6) |

| \*\*Operating Systems\*\* | Neso Academy | [Operating Systems](https://www.youtube.com/playlist?list=PLBlnK6fEyqRhqJPDXcvYlLfXPh37L89g3) |

| \*\*Operating Systems\*\* | Gate Smashers | [OS Tutorials](https://www.youtube.com/playlist?list=PLWPirh4EWFpHr\_1ZCkuF9ToYUrmujv9Aa) |

| \*\*Operating Systems\*\* | University of Birmingham | [Fundamentals of OS](https://www.youtube.com/playlist?list=PLW1yb8L3S1ngGmtKlI5XYcTNQQ1r3xZvq) |

| \*\*Computer Networks\*\* | Neso Academy | [Computer Networks](https://www.youtube.com/playlist?list=PLBlnK6fEyqRgLLlzdgiTUKULKJPYc0A4q) |

| \*\*Compiler Design\*\* | Neso Academy | [Compiler Design](https://www.youtube.com/playlist?list=PLBlnK6fEyqRjT3oJxFXRgjPNzeS-LFY-q) |

| \*\*Computer Architecture\*\* | Carnegie Mellon (Onur Mutlu) | [Computer Architecture](https://www.youtube.com/playlist?list=PL5Q2soXY2Zi9Eo29LMgKVcaydS7V1zZW3) |

| \*\*Signals and Systems\*\* | IIT Kharagpur | [Signals and Systems](https://www.youtube.com/playlist?list=PLgwJf8NK-2e54DNmA5iHqPfK9y-7SPFGy) |

| \*\*Signals and Systems\*\* | IIT Madras | [Signals and Systems](https://www.youtube.com/playlist?list=PLBlnK6fEyqRhG6s3jYIU48CqsT5cyiDTO) |

| \*\*Electric Circuits II\*\* | NPTEL | [Electric Circuits II](https://www.youtube.com/playlist?list=PLvgLolfaRAWdMQxSlGTwIRAFg\_qHOZMW4) |

## **Introductory Neuroscience (conceptual foundation)**

* YouTube playlists/channels:
  + Crash Course Neuroscience / Nervous System videos (great fast overview of neurons, synapses, circuits):
  + <https://www.youtube.com/watch?v=qPix_X-9t7E&list=PLOA0aRJ90NxuIgOC9YGRUT4Y-CsP12bsS>
  + ​​
  + Neuroscientifically Challenged “Neuroscience fundamentals” playlist (short 2–5 min conceptual videos):
  + <https://www.youtube.com/playlist?list=PLNZqyJnsvdMrr2Zfak7B89soUJo_jzqrH>
  + ​
  + MIT 9.13 The Human Brain – full semester MIT course (lectures + OCW notes):  
    Playlist:
  + <https://www.youtube.com/watch?v=ba-HMvDn_vU&list=PLUl4u3cNGP63gFHB6xb-kVBiQHYe_5-hM>
  + ​
* Free notes/text-style resources:
  + MIT OpenCourseWare – large neuroscience materials list (BCS department; multiple intro courses):
  + <https://ocw.mit.edu/search/?q=neuroscience>
  + ​
  + Neurology/Neuroscience playlist tied to Marieb A&P (for more anatomy/physiology style learning):
  + <https://www.youtube.com/playlist?list=PLTF9h-T1TcJgx3OFachdjHPMX6VE4VDS1>
  + ​

## **Computational Neuroscience / Neural Computation**

* Free textbooks and lecture series:
  + Computational Cognitive Neuroscience (O’Reilly et al.) – free online textbook + code:  
    Textbook repo:
  + <https://github.com/CompCogNeuro/book>
  + ​  
    Course site (text, slides, YouTube playlist, and sims):
  + <https://ccnlab.org/teaching/ccn/>
  + ​  
    Sims/code:
  + <https://github.com/CompCogNeuro/sims>
  + ​
  + “Computational Neuroscience” free online book (Greene; Python-heavy, accessible):
  + <https://mrgreene09.github.io/computational-neuroscience-textbook/>
  + ​
  + MIT “Introduction to Neural Computation” – full lecture note PDF set (mathy, very relevant to neural engineering):
  + <https://ocw.mit.edu/courses/9-40-introduction-to-neural-computation-spring-2018/pages/lecture-notes/>
  + ​
* Curated resource lists and GitHub repos:
  + Open Computational Neuroscience Resources – huge curated list of courses, books, data, tools:
  + <https://github.com/asoplata/open-computational-neuroscience-resources>
  + ​
  + OpenSourceBrain intro to computational neuroscience notes and links:
  + <https://github.com/OpenSourceBrain/OSB_Documentation/tree/master/contents/Help/Background_Information/02_Introduction_to_Computational_Neuroscience>
  + ​

## **Neural Engineering / Neuroengineering**

* Books / PDFs:
  + “Neural Engineering: Computation, Representation, and Dynamics in Neurobiological Systems” (Eliasmith & Anderson) – classic theoretical neural engineering text (full PDF):
  + <https://compneuro.uwaterloo.ca/files/Eliasmith.Anderson.2003.Neural.Engineering.Full.Book.pdf>
  + ​
  + “Neural Engineering” edited volume (broad overview of principles and applications; PDF):
  + <https://download.e-bookshelf.de/download/0003/9465/88/L-G-0003946588-0013326467.pdf>
  + ​
* Lecture notes / slides:
  + edX BioMed01x – Lesson 6: Neural Engineering transcript/notes (signal acquisition, interfaces):
  + <https://courses.edx.org/asset-v1:IEEEx+BioMed01x+2016T2+type@asset+block@BioMed01x_Transcripts_LESSON_6.pdf>
  + ​
  + Example neural engineering lecture slide deck (good for seeing how topics are organized):
  + <https://www.scribd.com/presentation/803200885/Lecture-15-Neural-Engineering>
  + ​

## **YouTube Courses / Playlists (general + mixed levels)**

* Crash Course “Neuroscience Crash Course” playlist (survey-style, fast pacing):
* <https://www.youtube.com/playlist?list=PLOA0aRJ90NxuIgOC9YGRUT4Y-CsP12bsS>
* ​
* UW “Intro to Neuroscience” (Bing Brunton) – 30+ hours of structured content, including computation and systems:  
  First lecture:
* <https://www.youtube.com/watch?v=xWcloVll138>
* (playlist linked in description)​
* #CNSacademy free neuroscience lectures (various levels):
* <https://www.youtube.com/playlist?list=PLg2e4R8SdhpfGfkRweEdrLI3gpkgSptCS>

## **Circuits and basic electronics – YouTube**

* Electric/Electronic Circuits (playlist):
* <https://www.youtube.com/playlist?list=PL1-PpkqcSWX4qNiSxizLIZK_hogj34UxX>
* ​
* MIT 6.002 Circuits and Electronics, Lecture 1 (playlist linked on page):
* <https://www.youtube.com/watch?v=AfQxyVuLeCs>
* ​
* Circuits & Electronics – Lecture 1 (course playlist):
* <https://www.youtube.com/watch?v=8gRYHMNh_Uo>
* ​
* DC Electrical Circuit Analysis (playlist):
* <https://www.youtube.com/playlist?list=PLxuejeK2BP_d5pCXQVfpTbw2kGGPj8PdV>
* ​
* DC Circuit Analysis (playlist):
* <https://www.youtube.com/playlist?list=PLdnqjKaksr8qQ9w3XY5zFXQ2H-zXQFMlI>
* ​
* Electronic Circuits (playlist):
* <https://www.youtube.com/playlist?list=PL0o_zxa4K1BV9E-N8tSExU1djL6slnjbL>
* ​
* Basic Electronics Course (playlist):
* <https://www.youtube.com/playlist?list=PLFF553CED56CDE25D>
* ​
* Practical Electronics & Circuits 101 – Intro to Semiconductors & Diodes:
* <https://www.youtube.com/watch?v=JHyprRSbJwg>
* ​

## **Circuits – free textbooks and notes**

* DC Electrical Circuit Analysis: A Practical Approach (open textbook main page):
* <https://open.umn.edu/opentextbooks/textbooks/884>
* ​
* Direct PDF of DC Electrical Circuit Analysis:
* <https://www.dissidents.com/resources/DCElectricalCircuitAnalysis.pdf>
* ​
* Alternate catalog entry for same text:
* <https://mds.marshall.edu/oa-textbooks/767/>
* ​
* DC Circuits (another OER text):
* <https://open.umn.edu/opentextbooks/textbooks/534>
* ​

## **Biomedical instrumentation – notes / texts**

* BIO–MEDICAL INSTRUMENTATION (Bharath University PDF):
* <https://www.bharathuniv.ac.in/colleges1/downloads/courseware_eee/Notes/NE2/BEE007%20BIO%20MEDICAL%20INSTRUMENTATION.pdf>
* ​
* Biomedical Instrumentation – SIC1311 (Sathyabama University, Unit‑I etc.):
* <https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SIC1311.pdf>
* ​
* Biomedical Instrumentation course material (mechatronics/EEE, Kanchi / related PDF):
* <https://kanchiuniv.ac.in/wp-content/uploads/2022/02/III-YEAR-MECHATRONICS-BMI-Course-Material-.pdf>
* ​
* Medical Instrumentation basics (ECE 445 notes, MSU):
* <https://www.egr.msu.edu/classes/ece445/mason/Files/2-Basics_ch1.pdf>
* ​
* Additional biomedical instrumentation lecture notes example:
* <https://charuslukv.files.wordpress.com/2020/09/lecture-2-introduction-to-biomedical-instrumenation.pdf>
* ​

## **Biomedical / biosignal processing – GitHub and tutorials**

* GitHub – Biomedical signal processing (MATLAB‑heavy course repo):
* <https://github.com/mendes-davi/biomedical-signal-processing>
* ​
* GitHub – Biomedical-Signal-Processing (Python & Jupyter notebooks):
* <https://github.com/parvathi25/Biomedical-Signal-Processing>
* ​
* GitHub topic page – biomedical-signal-processing (curated related repos):
* <https://github.com/topics/biomedical-signal-processing>
* ​
* GitHub topic page – biomedical-signal:
* <https://github.com/topics/biomedical-signal>
* ​
* Open research in Biomedical Signal Processing (PhysioNet/WFDB Python tutorials):
* <https://peterhcharlton.github.io/post/open_bsp/>

## **Organic Chemistry I & II / Advanced Organic**

* [Crash Course Organic Chemistry playlist](https://www.youtube.com/playlist?list=PL8dPuuaLjXtONguuhLdVmq0HTKS0jksS4)
* – Full sophomore-level orgo sequence on YouTube.​
* [Chad’s Organic Chemistry Complete Course](https://www.chadsprep.com/chads-organic-chemistry-videos/)
* – Full O‑chem I & II playlist with problem-solving focus.​​
* [Freshman Organic Chemistry with J. Michael McBride](https://www.youtube.com/playlist?list=PL3F629F73640F831D)
* – Yale lecture series (orgo I) on YouTube.​
* [The Organic Chemistry Tutor – Organic Chemistry](https://www.youtube.com/channel/UCEWpbFLzoYGPfuWUMFPSaoA)
* – Concept/theory + many worked problems.​
* [Full Lectures – Organic Chemistry 1](https://www.youtube.com/playlist?list=PL7YjEVaqJBfMFiNrd26Wqd0kHGzax7--y)
* – 24‑hour complete lecture playlist.​
* [organic-chemistry GitHub organization](https://github.com/organic-chemistry)
* – Misc organic-chem related repos/data sets.​
* [carbonate-plus – Interactive organic chemistry practice problems](https://github.com/csvoss/carbonate-plus)
* – GitHub repo with interactive orgo practice.​

## **Biochemistry I & II / Molecular Biology**

* [Professor Dave – Biochemistry playlist](https://www.youtube.com/playlist?list=PLybg94GvOJ9Fazvaf8unWl9J2soXCAvy4)
* – Structured YouTube biochem course; assumes gen chem + orgo.​
* [MCAT Biochem Comprehensive Course](https://www.youtube.com/watch?v=MKAUsP8J6f0)
* – Long-form playlist that systematically covers proteins, enzymes, metabolism, etc..​
* [Kevin Ahern’s BB 350 Biochemistry lectures](https://www.youtube.com/playlist?list=PL74ED4174166F94A8)
* – Full university biochem course on YouTube.​
* [Biochemistry Lecture series – Brian Francia](https://coconote.app/notes/a1568123-b8a9-4e44-8776-97fb7330a394/transcript)
* – Intro biochem university lectures on YouTube.​

## **Analytical Chemistry (basic + instrumental)**

* [Intro to Analytical Chemistry – CHM 214](https://conncoll.smartcatalogiq.com/en/2025-2026/catalog/courses/chm-chemistry/200/chm-214)
* – Full course-style YouTube series beginning with Chapter 0.​
* [Analytical Chemistry lectures playlist](https://www.youtube.com/playlist?list=PLfR17zX97Yimn1O2gbxkv4z0QN4Cs1xzt)
* – Short lecture videos for first/second-year analytical chem.​
* [Intro to Analytical Chemistry (course overview video)](https://www.youtube.com/watch?v=-RYOVsevKys)
* – Conceptual intro to what analytical chemists do.​
* [Analytical Chemistry and Measurement Science](https://www.manchester.ac.uk/study/online-blended-learning/courses/analytical-chemistry-and-measurement-science/)
* – Long talk covering X‑ray, MS, separations, chemometrics.​

## **Physical Chemistry / Thermodynamics / Chemical Dynamics**

* [Free Physical Chemistry Books – FreeBookCentre](https://www.freebookcentre.net/Chemistry/Physical-Chemistry-Books.html)
* – Aggregated free texts; many focus on thermodynamics and kinetics.​
* [Castellan – Physical Chemistry (PDF)](https://biopchem.education/wp-content/uploads/2018/02/castellan_physical_chemistry_3rd_ed.pdf)
* – Classic p‑chem text (thermo, equilibrium, kinetics).​
* [Physical Chemistry – Moore (PDF)](https://hostnezt.com/cssfiles/chemistry/Physical%20Chemistry%20By%20Moore.pdf)
* – University-level thermodynamics and kinetics text.​
* [A Textbook of Physical Chemistry – Volume on Thermodynamics](https://www.amazon.com/Physical-Chemistry-1-Thermodynamics-Kinetics/dp/1464124515)
* – Emphasis on equilibria, solutions, electrochemistry.​
* [Physical Chemistry – Volume 1 (Gerasimov)](https://archive.org/details/ya.-gerasimov-ed.-physical-chemistry-volume-1-mir-1974)
* – Internet Archive text focused on chemical thermodynamics.​
* [Physical Chemistry of Surfaces – Adamson & Gast](https://www.eng.uc.edu/~beaucag/Classes/AdvancedMaterialsThermodynamics/Books/Arthur%20W.%20Adamson,%20Alice%20P.%20Gast%20-%20Physical%20chemistry%20of%20surfaces-Wiley%20(1997).pdf)
* – Advanced text useful for interfacial thermo and biomaterials.​

## **Medicinal Chemistry / Chemical Biology**

* [Textbook of Medicinal Chemistry, Volume I – V. Alagarsamy](https://www.amazon.com/Textbook-Medicinal-Chemistry-4Ed-2022/dp/9390709687)
* – PDF text covering drug design basics, SAR, major drug classes.​
* [Textbook of Medicinal Chemistry, Volume II – V. Alagarsamy](https://alazharpharmacy.com/documents/level-4/semester-2/pharmaceutical-chemistry-2/TEXTBOOK-OF-MEDICINAL-CHEMISTRY.pdf)
* – Continuation with more therapeutic classes and SAR.​
* [Fundamentals of Medicinal Chemistry – Gareth Thomas](https://www.amazon.com/Fundamentals-Medicinal-Chemistry-Gareth-Thomas/dp/0470843071)
* – Undergrad‑level medicinal chem text with chapter problems.​
* [Medicinal Chemistry I – Nootan College PDF](https://nootanpharmacy.in/public/upload/yGT7VT08kPN4q9DXJXtY7a5QdX2cGfVOHdLMoKt8.pdf)
* – Concise intro: physico‑chemical parameters, drug metabolism, basics of med chem.​
* [An Introduction to Medicinal Chemistry](https://uogqueensmcf.com/wp-content/uploads/2020/BA%20Modules/Pharmacy/Year%20II%20(semester%202)/Medicinal%20Chemistry%20I/Reference%20books/An%20Introduction%20to%20Medicinal%20Chemistry%205th%20ed%20-%20Graham%20L.%20Patrick%20(OUP,%202013).pdf)
* – Widely used undergrad med‑chem text available as PDF.​
* [Organic Medicinal and Pharmaceutical Chemistry (Wilson & Gisvold)](https://pharmabookbank.files.wordpress.com/2019/03/12.1.mchem_.pdf)
* – Comprehensive reference text (PDF).​

## **Data / Research‑Oriented GitHub Repos (for projects)**

* [awesome-chemistry-datasets](https://github.com/kjappelbaum/awesome-chemistry-datasets)
* – Curated datasets for solubility, reactions, spectra, etc., useful for ML or data projects.​
* [rxn\_yields](https://github.com/rxn4chemistry/rxn_yields)
* – Repository for ML models and data on reaction yield prediction.​
* [Doyle lab GitHub](https://github.com/doyle-lab-ucla)
* – Research code at the interface of organic, physical-organic, and computational chemistry.

## **React**

Top libraries focus on UI components, state, and utilities. Key picks include Material UI (MUI) for design systems, TanStack Query for data fetching, and React Hook Form for forms.​

* Material UI:
* <https://mui.com/>
* | GitHub:
* <https://github.com/mui/material-ui>
* shadcn/ui:
* <https://ui.shadcn.com/>
* | GitHub:
* <https://github.com/shadcn-ui/ui>
* TanStack Query:
* <https://tanstack.com/query>
* | GitHub:
* <https://github.com/TanStack/query>
* React Hook Form:
* <https://react-hook-form.com/>
* | GitHub:
* <https://github.com/react-hook-form/react-hook-form>
* Awesome React Components (curated list):
* <https://github.com/brillout/awesome-react-components>
* ​

Free textbooks: "Road to React" (free chapters online via

<https://www.roadtoreact.com/>

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## **Next.js**

Libraries enhance SSR, data handling, and UI. React Query/SWR for caching, Tailwind for styling, and Prisma for ORM stand out.​

* TanStack Query:
* <https://tanstack.com/query>
* | GitHub:
* <https://github.com/TanStack/query>
* Tailwind CSS:
* <https://tailwindcss.com/>
* | GitHub:
* <https://github.com/tailwindlabs/tailwindcss>
* Prisma ORM:
* <https://www.prisma.io/>
* | GitHub:
* <https://github.com/prisma/prisma>
* NextAuth.js:
* <https://authjs.dev/>
* | GitHub:
* <https://github.com/nextauthjs/next-auth>
* Awesome Next.js (curated):
* <https://github.com/unicodeveloper/awesome-nextjs>
* ​

Free textbooks: FullStackOpen (includes Next.js):

[https://fullstackopen.com/.](https://fullstackopen.com/)

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## **Node.js**

Essential for servers and real-time apps. Express for web frameworks, Socket.io for websockets.​

* Express:
* <https://expressjs.com/>
* | GitHub:
* <https://github.com/expressjs/express>
* Socket.io:
* <https://socket.io/>
* | GitHub:
* <https://github.com/socketio/socket.io>
* Nodemon:
* <https://nodemon.io/>
* | GitHub:
* <https://github.com/remy/nodemon>

Free textbooks: "Node.js Design Patterns" (free excerpts via GitHub searches).

## **Django/Python**

Django for full-stack web; NumPy/Pandas for data.​

* Django:
* <https://www.djangoproject.com/>
* | GitHub:
* <https://github.com/django/django>
* NumPy:
* <https://numpy.org/>
* | GitHub:
* <https://github.com/numpy/numpy>
* Pandas:
* <https://pandas.pydata.org/>
* | GitHub:
* <https://github.com/pandas-dev/pandas>
* FastAPI (Python alt):
* <https://fastapi.tiangolo.com/>
* | GitHub:
* <https://github.com/tiangolo/fastapi>

Free textbooks: "Django for Professionals" (free PDF via official docs); "Automate the Boring Stuff with Python":

<https://automatetheboringstuff.com/>

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## **MATLAB**

Open-source alternatives and toolboxes for numerics, signals.​

* Chebfun:
* <http://www.chebfun.org/>
* | GitHub:
* <https://github.com/chebfun/chebfun>
* FieldTrip (EEG/MEG):
* <https://www.fieldtriptoolbox.org/>
* | GitHub:
* <https://github.com/fieldtrip/fieldtrip>
* Awesome MATLAB:
* <https://github.com/caomw/awesome-matlab-1>
* ​

Free textbooks: MIT OCW MATLAB courses:

[https://ocw.mit.edu/courses/18-s997-introduction-to-matlab-programming-fall-2011/.](https://ocw.mit.edu/courses/18-s997-introduction-to-matlab-programming-fall-2011/)

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## **TypeScript**

Type-safe utils and FP libraries.​

* fp-ts:
* <https://gcanti.github.io/fp-ts/>
* | GitHub:
* <https://github.com/gcanti/fp-ts>
* ts-toolbelt:
* <https://millsp.github.io/ts-toolbelt/>
* | GitHub:
* <https://github.com/millsp/ts-toolbelt>
* Awesome TypeScript:
* <https://github.com/jellydn/awesome-typesafe>
* ​

Free textbooks: TypeScript Handbook:

[https://www.typescriptlang.org/docs/handbook/.](https://www.typescriptlang.org/docs/handbook/)

​

## **C**

Data structures and utilities.​

* Collections-C:
* <https://github.com/srdja/Collections-C>
* GLib:
* <https://gitlab.gnome.org/GNOME/glib>
* | Often compiled from source.

Free textbooks: "The C Programming Language" (K&R, free excerpts via GitHub).

## **C++**

STL extensions, frameworks like Boost, Qt.​

* Boost:
* <https://www.boost.org/>
* | GitHub:
* <https://github.com/boostorg/boost>
* Awesome C++:
* <https://github.com/fffaraz/awesome-cpp>
* ​
* Eigen (linear algebra):
* <http://eigen.tuxfamily.org/>
* | GitHub:
* <https://gitlab.com/libeigen/eigen>

Free textbooks: "C++ Primer" (free samples); MIT OCW:

[https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-s096-introduction-to-c-and-c-january-iap-2013/.](https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-s096-introduction-to-c-and-c-january-iap-2013/)

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## **C#**

.NET ecosystem libraries; Unity for games, but core: Entity Framework [general knowledge, aligned with searches].

* Entity Framework:
* <https://learn.microsoft.com/ef/>
* | GitHub:
* <https://github.com/dotnet/efcore>
* Awesome C#:
* <https://github.com/dotnet-architecture/eShopOnWeb>

Free textbooks: Microsoft Learn C# docs:

<https://learn.microsoft.com/dotnet/csharp/>

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## **Flutter**

State/UI: Riverpod, Dio [prior ].

* Riverpod:
* <https://riverpod.dev/>
* |
* <https://pub.dev/packages/riverpod>
* Dio:
* <https://pub.dev/packages/dio>
* Awesome Flutter:
* <https://github.com/Solido/awesome-flutter>

Free textbooks: Flutter docs:

<https://docs.flutter.dev/>

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## **Swift**

UI/state for iOS [general, aligned].

* SwiftUI (built-in), Alamofire (networking):
* <https://github.com/Alamofire/Alamofire>
* Awesome Swift:
* <https://github.com/matteocrippa/awesome-swift>

Free textbooks: "The Swift Programming Language":

<https://docs.swift.org/swift-book/>

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## **SQL**

ORMs/clients like Prisma, DBeaver tools.​

* Prisma (multi-DB):
* <https://www.prisma.io/>
* | GitHub:
* <https://github.com/prisma/prisma>
* SQLAlchemy (Python SQL):
* <https://www.sqlalchemy.org/>
* | GitHub:
* <https://github.com/sqlalchemy/sqlalchemy>

Free textbooks: "SQL Cookbook": free excerpts; Use The Index Luke:

<https://use-the-index-luke.com/sql/>

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## **Neuro science**

Open-access neuroscience textbooks tailored for psychology contexts provide foundational knowledge on brain structure, function, and behavior.

* *Introduction to Behavioral Neuroscience* by Ohio State University and Auburn College: Covers cellular anatomy to executive function, ideal for entry-level psychology courses.[neuronline.sfn](https://neuronline.sfn.org/training/open-access-textbook-for-neuroscience-learning)​
* *Neuroscience: 2nd Canadian Edition* and *Neuroscience Online* by UT Health Science Center: Comprehensive overviews of neural form, function, and behavioral links.[pmc.ncbi.nlm.nih](https://pmc.ncbi.nlm.nih.gov/articles/PMC10653246/)​
* *Introduction to Neuroscience* by Michigan State University: Targets introductory courses with psychology-relevant topics.[open.umn](https://open.umn.edu/opentextbooks/textbooks/1303)​
* *Introduction to Psychology & Neuroscience (2nd Edition)*: OpenStax adaptation blending psych and neuro basics.[pressbooks.atlanticoer-relatlantique](https://pressbooks.atlanticoer-relatlantique.ca/intropsychneuro/)​

Direct links: [OpenStax Behavioral Neuroscience](https://openstax.org/details/books/introduction-behavioral-neuroscience), [Neuroscience Online](https://nba.uth.tmc.edu/neuroscience/), [MSU Intro Neuroscience](https://open.umn.edu/opentextbooks/textbooks/1303), [Psychology & Neuroscience](https://pressbooks.atlanticoer-relatlantique.ca/intropsychneuro/).

## **Online Courses and MOOCs**

Free MOOCs from top universities emphasize neuroscience's role in psychology, such as behavior, memory, and disorders.

* Harvard's *Fundamentals of Neuroscience* series (Parts 1-3): Explores neuron electrical properties, networks, and brain imaging.[pll.harvard+1](https://pll.harvard.edu/course/fundamentals-neuroscience-part-1-electrical-properties-neuron)​
* Coursera's *Understanding the Brain: The Neurobiology of Everyday Life* (UChicago): Links neural processes to daily behaviors.[coursera](https://www.coursera.org/learn/neurobiology)​
* edX's *Behavioral Neuroscience: Foundations of Compulsive Behaviors* (U Alaska): Covers research on behavior using lab models.[edx](https://www.edx.org/learn/neuroscience/university-of-alaska-fairbanks-behavioral-neuroscience-foundations-of-compulsive-behaviors)​
* Duke's *Medical Neuroscience*: Functional organization and neurophysiology with psych applications.[my-mooc](https://www.my-mooc.com/en/mooc/medicalneuro-f8e332be-a442-457b-b91e-3fea57c128f7)​

Direct links: [Harvard Part 1](https://pll.harvard.edu/course/fundamentals-neuroscience-part-1-electrical-properties-neuron), [UChicago Coursera](https://www.coursera.org/learn/neurobiology), [edX Behavioral Neuro](https://www.edx.org/learn/neuroscience/university-of-alaska-fairbanks-behavioral-neuroscience-foundations-of-compulsive-behavior), [Medical Neuroscience](https://www.my-mooc.com/en/mooc/medicalneuro-f8e332be-a442-457b-b91e-3fea57c128f7).

## **Additional Academic Resources**

Curated sites offer videos, interactive tools, and primers for psychology-focused neuroscience study.

* Society for Neuroscience's *Brain Facts*: Primer on brain/nervous system with psych underpinnings.[macmillanlearning](https://community.macmillanlearning.com/t5/psychology-blog/free-resources-neuroscience-and-i-o/ba-p/21900)​
* Open Culture's free psych/neuro courses: Yale, MIT, UChicago lectures on brain and behavior.[openculture](https://www.openculture.com/psychology_free_courses)​
* Simply Neuroscience resources: Free educational materials for all levels.[simplyneuroscience](https://www.simplyneuroscience.org/resources)​

Direct links: [Brain Facts](https://www.brainfacts.org/the-brain-facts-book), [Open Culture](https://www.openculture.com/psychology_free_courses), [Simply Neuroscience](https://www.simplyneuroscience.org/resources).[simplyneuroscience](https://www.simplyneuroscience.org/resources)​

1. <https://neuronline.sfn.org/training/open-access-textbook-for-neuroscience-learning>
2. <https://pmc.ncbi.nlm.nih.gov/articles/PMC10653246/>
3. <https://open.umn.edu/opentextbooks/textbooks/1303>
4. <https://pressbooks.atlanticoer-relatlantique.ca/intropsychneuro/>
5. <https://pll.harvard.edu/course/fundamentals-neuroscience-part-1-electrical-properties-neuron>
6. <https://pll.harvard.edu/subject/neuroscience>
7. <https://www.coursera.org/learn/neurobiology>
8. <https://www.edx.org/learn/neuroscience/university-of-alaska-fairbanks-behavioral-neuroscience-foundations-of-compulsive-behaviors>
9. <https://www.my-mooc.com/en/mooc/medicalneuro-f8e332be-a442-457b-b91e-3fea57c128f7>
10. <https://community.macmillanlearning.com/t5/psychology-blog/free-resources-neuroscience-and-i-o/ba-p/21900>
11. <https://www.openculture.com/psychology_free_courses>
12. <https://www.simplyneuroscience.org/resources>
13. <https://www.stratleader.net/neuroscience-resources>
14. <https://library.fiu.edu/PSB3101>
15. <https://www.psychology.org/resources/free-online-psychology-courses/>
16. <https://neurosciencenews.com/free-neuroscience-moocs/>
17. <https://open.umn.edu/opentextbooks/textbooks/neuroscience-psychology-and-conflict-management>
18. <http://topix.teachpsych.org/Neuroscience-in-the-Classroom>
19. <https://via.library.depaul.edu/cshtextbooks/2/>
20. <https://sites.google.com/swbgs.com/psychologydept/extra-curricular/moocs>

# **Comprehensive Free Educational Resources - Direct Links**

## **COMPUTER SCIENCE**

### **Core Platforms**

* **MIT OpenCourseWare**: https://ocw.mit.edu
* **Stanford Online**: https://online.stanford.edu

### **Introductory CS**

* **MIT 6.0001** - Introduction to CS and Programming in Python  
  + Course Page: https://ocw.mit.edu/courses/6-0001-introduction-to-computer-science-and-programming-in-python-fall-2016/
  + Alternative (slower pace): https://ocw.mit.edu/courses/6-100l-introduction-to-cs-and-programming-using-python-fall-2022/
  + Videos, assignments, lecture notes all available
* **MIT 6.01SC** - Introduction to Electrical Engineering and Computer Science I  
  + Course Page: https://ocw.mit.edu/courses/6-01sc-introduction-to-electrical-engineering-and-computer-science-i-spring-2011/
  + Complete OCW Scholar course with videos, recitations, labs, homework

### **Algorithms & Data Structures**

* **Tim Roughgarden's Algorithms Specialization (Stanford)**
  + Coursera: https://www.coursera.org/specializations/algorithms
  + 4-course specialization covering asymptotic notation, divide-and-conquer, randomized algorithms, graph algorithms, shortest paths, data structures
  + Can audit for free
* **Princeton Algorithms I & II (Sedgewick & Wayne)**
  + Part I: https://www.coursera.org/learn/algorithms-part1
  + Part II: https://www.coursera.org/learn/algorithms-part2
  + Implementation-focused, includes programming assignments in Java
  + Free to audit
* **MIT 6.006** - Introduction to Algorithms
  + Course Page: https://ocw.mit.edu/courses/6-006-introduction-to-algorithms-spring-2020/
* **MIT 6.046J** - Design and Analysis of Algorithms
  + Course Page: https://ocw.mit.edu/courses/6-046j-design-and-analysis-of-algorithms-spring-2015/

### **GitHub Repository Aggregators**

## **React**

Top libraries focus on UI components, state, and utilities. Key picks include Material UI (MUI) for design systems, TanStack Query for data fetching, and React Hook Form for forms.[github+2](https://github.com/brillout/awesome-react-components)​

* Material UI:<https://mui.com/> | GitHub:<https://github.com/mui/material-ui>
* shadcn/ui:<https://ui.shadcn.com/> | GitHub:<https://github.com/shadcn-ui/ui>
* TanStack Query:<https://tanstack.com/query> | GitHub:<https://github.com/TanStack/query>
* React Hook Form:<https://react-hook-form.com/> | GitHub:<https://github.com/react-hook-form/react-hook-form>
* Awesome React Components (curated list): [https://github.com/brillout/awesome-react-componentsgithub](https://github.com/brillout/awesome-react-components)​

Free textbooks: "Road to React" (free chapters online via<https://www.roadtoreact.com/>).

## **Next.js**

Libraries enhance SSR, data handling, and UI. React Query/SWR for caching, Tailwind for styling, and Prisma for ORM stand out.[strapi+1](https://strapi.io/blog/nextjs-libraries)​

* TanStack Query:<https://tanstack.com/query> | GitHub:<https://github.com/TanStack/query>
* Tailwind CSS:<https://tailwindcss.com/> | GitHub:<https://github.com/tailwindlabs/tailwindcss>
* Prisma ORM:<https://www.prisma.io/> | GitHub:<https://github.com/prisma/prisma>
* NextAuth.js:<https://authjs.dev/> | GitHub:<https://github.com/nextauthjs/next-auth>
* Awesome Next.js (curated): [https://github.com/unicodeveloper/awesome-nextjsgithub](https://github.com/unicodeveloper/awesome-nextjs)​

Free textbooks: FullStackOpen (includes Next.js): [https://fullstackopen.com/.](https://fullstackopen.com/)library​

## **Node.js**

Essential for servers and real-time apps. Express for web frameworks, Socket.io for websockets.[intuz+1](https://www.intuz.com/node-js-frameworks)​

* Express:<https://expressjs.com/> | GitHub:<https://github.com/expressjs/express>
* Socket.io:<https://socket.io/> | GitHub:<https://github.com/socketio/socket.io>
* Nodemon:<https://nodemon.io/> | GitHub:<https://github.com/remy/nodemon>

Free textbooks: "Node.js Design Patterns" (free excerpts via GitHub searches).

## **Django/Python**

Django for full-stack web; NumPy/Pandas for data.[browserstack+1](https://www.browserstack.com/guide/top-python-web-development-frameworks)​

* Django:<https://www.djangoproject.com/> | GitHub:<https://github.com/django/django>
* NumPy:<https://numpy.org/> | GitHub:<https://github.com/numpy/numpy>
* Pandas:<https://pandas.pydata.org/> | GitHub:<https://github.com/pandas-dev/pandas>
* FastAPI (Python alt):<https://fastapi.tiangolo.com/> | GitHub:<https://github.com/tiangolo/fastapi>

Free textbooks: "Django for Professionals" (free PDF via official docs); "Automate the Boring Stuff with Python":<https://automatetheboringstuff.com/>.

## **MATLAB**

Open-source alternatives and toolboxes for numerics, signals.[analyticsinsight+1](https://www.analyticsinsight.net/tech-news/best-open-source-matlab-libraries-in-2025)​

* Chebfun:<http://www.chebfun.org/> | GitHub:<https://github.com/chebfun/chebfun>
* FieldTrip (EEG/MEG):<https://www.fieldtriptoolbox.org/> | GitHub:<https://github.com/fieldtrip/fieldtrip>
* Awesome MATLAB: [https://github.com/caomw/awesome-matlab-1github](https://github.com/caomw/awesome-matlab-1)​

Free textbooks: MIT OCW MATLAB courses: [https://ocw.mit.edu/courses/18-s997-introduction-to-matlab-programming-fall-2011/.](https://ocw.mit.edu/courses/18-s997-introduction-to-matlab-programming-fall-2011/)library​

## **TypeScript**

Type-safe utils and FP libraries.[github+1](https://github.com/jellydn/awesome-typesafe)​

* fp-ts:<https://gcanti.github.io/fp-ts/> | GitHub:<https://github.com/gcanti/fp-ts>
* ts-toolbelt:<https://millsp.github.io/ts-toolbelt/> | GitHub:<https://github.com/millsp/ts-toolbelt>
* Awesome TypeScript: [https://github.com/jellydn/awesome-typesafegithub](https://github.com/jellydn/awesome-typesafe)​

Free textbooks: TypeScript Handbook: [https://www.typescriptlang.org/docs/handbook/.](https://www.typescriptlang.org/docs/handbook/)[dev](https://dev.to/kumarkalyan/top-15-github-repositories-to-achieve-typescript-mastery-gk0)​

## **C**

Data structures and utilities.[github](https://github.com/srdja/Collections-C)​

* Collections-C:<https://github.com/srdja/Collections-C>
* GLib:<https://gitlab.gnome.org/GNOME/glib> | Often compiled from source.

Free textbooks: "The C Programming Language" (K&R, free excerpts via GitHub).

## **C++**

STL extensions, frameworks like Boost, Qt.[github+2](https://github.com/fffaraz/awesome-cpp)​

* Boost:<https://www.boost.org/> | GitHub:<https://github.com/boostorg/boost>
* Awesome C++: [https://github.com/fffaraz/awesome-cppgithub](https://github.com/fffaraz/awesome-cpp)​
* Eigen (linear algebra):<http://eigen.tuxfamily.org/> | GitHub:<https://gitlab.com/libeigen/eigen>

Free textbooks: "C++ Primer" (free samples); MIT OCW: [https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-s096-introduction-to-c-and-c-january-iap-2013/.](https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-s096-introduction-to-c-and-c-january-iap-2013/)library​

## **C#**

.NET ecosystem libraries; Unity for games, but core: Entity Framework [general knowledge, aligned with searches].

* Entity Framework:<https://learn.microsoft.com/ef/> | GitHub:<https://github.com/dotnet/efcore>
* Awesome C#:<https://github.com/dotnet-architecture/eShopOnWeb>

Free textbooks: Microsoft Learn C# docs:<https://learn.microsoft.com/dotnet/csharp/>.

## **Flutter**

State/UI: Riverpod, Dio [prior ].

* Riverpod:<https://riverpod.dev/> |<https://pub.dev/packages/riverpod>
* Dio:<https://pub.dev/packages/dio>
* Awesome Flutter:<https://github.com/Solido/awesome-flutter>

Free textbooks: Flutter docs:<https://docs.flutter.dev/>.

## **Swift**

UI/state for iOS [general, aligned].

* SwiftUI (built-in), Alamofire (networking):<https://github.com/Alamofire/Alamofire>
* Awesome Swift:<https://github.com/matteocrippa/awesome-swift>

Free textbooks: "The Swift Programming Language":<https://docs.swift.org/swift-book/>.

## **SQL**

ORMs/clients like Prisma, DBeaver tools.[strapi](https://strapi.io/blog/nextjs-libraries)​

* Prisma (multi-DB):<https://www.prisma.io/> | GitHub:<https://github.com/prisma/prisma>
* SQLAlchemy (Python SQL):<https://www.sqlalchemy.org/> | GitHub:<https://github.com/sqlalchemy/sqlalchemy>

Free textbooks: "SQL Cookbook": free excerpts; Use The Index Luke:<https://use-the-index-luke.com/sql/>.

Add to follow-up

Check sources

* <https://github.com/brillout/awesome-react-components>
* <https://prismic.io/blog/react-component-libraries>
* <https://www.untitledui.com/blog/react-component-libraries>
* <https://strapi.io/blog/nextjs-libraries>
* <https://github.com/unicodeveloper/awesome-nextjs>
* <https://www.perplexity.ai/search/961d6579-40c7-42a0-9ee7-0b67941e1f4a>
* <https://www.intuz.com/node-js-frameworks>
* <https://dev.to/antoniofromlitlyx/top-20-javascript-libraries-on-github-ljn>
* <https://www.browserstack.com/guide/top-python-web-development-frameworks>
* <https://blog.jetbrains.com/pycharm/2025/09/the-most-popular-python-frameworks-and-libraries-in-2025/>
* <https://www.analyticsinsight.net/tech-news/best-open-source-matlab-libraries-in-2025>
* <https://github.com/caomw/awesome-matlab-1>
* <https://www.perplexity.ai/search/781a405d-7ff3-4283-8af4-1fe7d2b1eae5>
* <https://github.com/jellydn/awesome-typesafe>
* <https://dev.to/kumarkalyan/top-15-github-repositories-to-achieve-typescript-mastery-gk0>
* <https://github.com/srdja/Collections-C>
* <https://github.com/fffaraz/awesome-cpp>
* <https://www.reddit.com/r/cpp/comments/1i8a5lm/mustknow_librariesframeworkstechnologies_for_c/>
* <https://github.com/p-ranav/awesome-hpp>
* <https://github.com/orgs/community/discussions/164265>
* <https://pmbanugo.me/blog/top-x-react-ui-library>
* <https://dev.to/joodi/10-must-try-react-libraries-for-2025-1ob>
* **OSSU Computer Science** (Complete CS degree curriculum)  
  + Repository: https://github.com/ossu/computer-science
  + Website: Follow curriculum structure with links to all courses
* **Prakhar1989 Awesome Courses** (Curated university courses)  
  + Repository: https://github.com/prakhar1989/awesome-courses
  + Hundreds of courses with assignments, videos, notes
* **Developer-Y CS Video Courses**
  + Repository: https://github.com/Developer-Y/cs-video-courses
  + Comprehensive list with video lectures
* **ForrestKnight Open Source CS**
  + Repository: https://github.com/ForrestKnight/open-source-cs

## **ELECTRICAL ENGINEERING & CIRCUITS**

### **MIT OCW Circuits Courses**

* **MIT 6.002** - Circuits and Electronics  
  + Course Page: https://ocw.mit.edu/courses/6-002-circuits-and-electronics-spring-2007/
  + Includes lecture videos, simulations (Java Mathlets), problem sets, exams
* **MIT 6.01SC** - Circuits Unit (included in EECS I above)  
  + Hands-on robot applications of circuit theory

## **Free Textbooks**

Open-access neuroscience textbooks tailored for psychology contexts provide foundational knowledge on brain structure, function, and behavior.

* *Introduction to Behavioral Neuroscience* by Ohio State University and Auburn College: Covers cellular anatomy to executive function, ideal for entry-level psychology courses.[neuronline.sfn](https://neuronline.sfn.org/training/open-access-textbook-for-neuroscience-learning)​
* *Neuroscience: 2nd Canadian Edition* and *Neuroscience Online* by UT Health Science Center: Comprehensive overviews of neural form, function, and behavioral links.[pmc.ncbi.nlm.nih](https://pmc.ncbi.nlm.nih.gov/articles/PMC10653246/)​
* *Introduction to Neuroscience* by Michigan State University: Targets introductory courses with psychology-relevant topics.[open.umn](https://open.umn.edu/opentextbooks/textbooks/1303)​
* *Introduction to Psychology & Neuroscience (2nd Edition)*: OpenStax adaptation blending psych and neuro basics.[pressbooks.atlanticoer-relatlantique](https://pressbooks.atlanticoer-relatlantique.ca/intropsychneuro/)​

Direct links: [OpenStax Behavioral Neuroscience](https://openstax.org/details/books/introduction-behavioral-neuroscience), [Neuroscience Online](https://nba.uth.tmc.edu/neuroscience/), [MSU Intro Neuroscience](https://open.umn.edu/opentextbooks/textbooks/1303), [Psychology & Neuroscience](https://pressbooks.atlanticoer-relatlantique.ca/intropsychneuro/).

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* Coursera's *Understanding the Brain: The Neurobiology of Everyday Life* (UChicago): Links neural processes to daily behaviors.[coursera](https://www.coursera.org/learn/neurobiology)​
* edX's *Behavioral Neuroscience: Foundations of Compulsive Behaviors* (U Alaska): Covers research on behavior using lab models.[edx](https://www.edx.org/learn/neuroscience/university-of-alaska-fairbanks-behavioral-neuroscience-foundations-of-compulsive-behaviors)​
* Duke's *Medical Neuroscience*: Functional organization and neurophysiology with psych applications.[my-mooc](https://www.my-mooc.com/en/mooc/medicalneuro-f8e332be-a442-457b-b91e-3fea57c128f7)​

Direct links: [Harvard Part 1](https://pll.harvard.edu/course/fundamentals-neuroscience-part-1-electrical-properties-neuron), [UChicago Coursera](https://www.coursera.org/learn/neurobiology), [edX Behavioral Neuro](https://www.edx.org/learn/neuroscience/university-of-alaska-fairbanks-behavioral-neuroscience-foundations-of-compulsive-behavior), [Medical Neuroscience](https://www.my-mooc.com/en/mooc/medicalneuro-f8e332be-a442-457b-b91e-3fea57c128f7).

## **Additional Academic Resources**

Curated sites offer videos, interactive tools, and primers for psychology-focused neuroscience study.

Here are direct links for the main resources mentioned earlier, grouped by topic. All are free to access; be sure to follow any license terms on each site.[open.umn+8](https://open.umn.edu/opentextbooks/textbooks/884)​youtube​

## **Circuits and basic electronics – YouTube**

* Electric/Electronic Circuits (playlist): [https://www.youtube.com/playlist?list=PL1-PpkqcSWX4qNiSxizLIZK\_hogj34UxXyoutube](https://www.youtube.com/playlist?list=PL1-PpkqcSWX4qNiSxizLIZK_hogj34UxX)​
* MIT 6.002 Circuits and Electronics, Lecture 1 (playlist linked on page):<https://www.youtube.com/watch?v=AfQxyVuLeCs>youtube​
* Circuits & Electronics – Lecture 1 (course playlist):<https://www.youtube.com/watch?v=8gRYHMNh_Uo>youtube​
* DC Electrical Circuit Analysis (playlist): [https://www.youtube.com/playlist?list=PLxuejeK2BP\_d5pCXQVfpTbw2kGGPj8PdVyoutube](https://www.youtube.com/playlist?list=PLxuejeK2BP_d5pCXQVfpTbw2kGGPj8PdV)​
* DC Circuit Analysis (playlist): [https://www.youtube.com/playlist?list=PLdnqjKaksr8qQ9w3XY5zFXQ2H-zXQFMlIyoutube](https://www.youtube.com/playlist?list=PLdnqjKaksr8qQ9w3XY5zFXQ2H-zXQFMlI)​
* Electronic Circuits (playlist): [https://www.youtube.com/playlist?list=PL0o\_zxa4K1BV9E-N8tSExU1djL6slnjbLyoutube](https://www.youtube.com/playlist?list=PL0o_zxa4K1BV9E-N8tSExU1djL6slnjbL)​
* Basic Electronics Course (playlist): [https://www.youtube.com/playlist?list=PLFF553CED56CDE25Dyoutube](https://www.youtube.com/playlist?list=PLFF553CED56CDE25D)​
* Practical Electronics & Circuits 101 – Intro to Semiconductors & Diodes:<https://www.youtube.com/watch?v=JHyprRSbJwg>youtube​

## **Circuits – free textbooks and notes**

* DC Electrical Circuit Analysis: A Practical Approach (open textbook main page): [https://open.umn.edu/opentextbooks/textbooks/884open.umn](https://open.umn.edu/opentextbooks/textbooks/884)​
* Direct PDF of DC Electrical Circuit Analysis:<https://www.dissidents.com/resources/DCElectricalCircuitAnalysis.pdf>[dissidents](http://www.dissidents.com/resources/DCElectricalCircuitAnalysis.pdf)​
* Alternate catalog entry for same text: [https://mds.marshall.edu/oa-textbooks/767/mds.marshall](https://mds.marshall.edu/oa-textbooks/767/)​
* DC Circuits (another OER text): [https://open.umn.edu/opentextbooks/textbooks/534open.umn](https://open.umn.edu/opentextbooks/textbooks/534)​

## **Biomedical instrumentation – notes / texts**

* BIO–MEDICAL INSTRUMENTATION (Bharath University PDF):  
  [https://www.bharathuniv.ac.in/colleges1/downloads/courseware\_eee/Notes/NE2/BEE007%20BIO%20MEDICAL%20INSTRUMENTATION.pdfbharathuniv](https://www.bharathuniv.ac.in/colleges1/downloads/courseware_eee/Notes/NE2/BEE007%20BIO%20MEDICAL%20INSTRUMENTATION.pdf)​
* Biomedical Instrumentation – SIC1311 (Sathyabama University, Unit‑I etc.):  
  [https://sist.sathyabama.ac.in/sist\_coursematerial/uploads/SIC1311.pdfsist.sathyabama](https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SIC1311.pdf)​
* Biomedical Instrumentation course material (mechatronics/EEE, Kanchi / related PDF):  
  [https://kanchiuniv.ac.in/wp-content/uploads/2022/02/III-YEAR-MECHATRONICS-BMI-Course-Material-.pdfkanchiuniv](https://kanchiuniv.ac.in/wp-content/uploads/2022/02/III-YEAR-MECHATRONICS-BMI-Course-Material-.pdf)​
* Medical Instrumentation basics (ECE 445 notes, MSU):  
  [https://www.egr.msu.edu/classes/ece445/mason/Files/2-Basics\_ch1.pdfegr.msu](https://www.egr.msu.edu/classes/ece445/mason/Files/2-Basics_ch1.pdf)​
* Additional biomedical instrumentation lecture notes example:  
  [https://charuslukv.files.wordpress.com/2020/09/lecture-2-introduction-to-biomedical-instrumenation.pdfcharuslukv.wordpress](https://charuslukv.files.wordpress.com/2020/09/lecture-2-introduction-to-biomedical-instrumenation.pdf)​

## **Biomedical / biosignal processing – GitHub and tutorials**

* GitHub – Biomedical signal processing (MATLAB‑heavy course repo):  
  [https://github.com/mendes-davi/biomedical-signal-processinggithub](https://github.com/mendes-davi/biomedical-signal-processing)​
* GitHub – Biomedical-Signal-Processing (Python & Jupyter notebooks):  
  [https://github.com/parvathi25/Biomedical-Signal-Processinggithub](https://github.com/parvathi25/Biomedical-Signal-Processing)​
* GitHub topic page – biomedical-signal-processing (curated related repos):  
  [https://github.com/topics/biomedical-signal-processinggithub](https://github.com/topics/biomedical-signal-processing)​
* GitHub topic page – biomedical-signal:  
  [https://github.com/topics/biomedical-signalgithub](https://github.com/topics/biomedical-signal)​
* Open research in Biomedical Signal Processing (PhysioNet/WFDB Python tutorials):  
  [https://peterhcharlton.github.io/post/open\_bsp/peterhcharlton.github](https://peterhcharlton.github.io/post/open_bsp/)​

## **How to use these quickly**

* Circuits: pair one full playlist (e.g., MIT 6.002 or DC Electrical Circuit Analysis) with the Fiore text PDF for problems.[dissidents+2](http://www.dissidents.com/resources/DCElectricalCircuitAnalysis.pdf)​youtube​
* Biomedical instrumentation: read through one full PDF (Bharath or Sathyabama) and treat Kanchi/MSU notes as supplemental examples and exam‑style outlines.[bharathuniv+3](https://www.bharathuniv.ac.in/colleges1/downloads/courseware_eee/Notes/NE2/BEE007%20BIO%20MEDICAL%20INSTRUMENTATION.pdf)​
* Biosignal processing: clone one of the GitHub repos and work through a PhysioNet‑based tutorial to connect theory with real ECG/PPG/EEG data.[github+4](https://github.com/mendes-davi/biomedical-signal-processing)​

If you tell which course you want to start with first, a week‑by‑week micro‑plan can be built directly around these links.

* <https://open.umn.edu/opentextbooks/textbooks/884>
* <https://www.bharathuniv.ac.in/colleges1/downloads/courseware_eee/Notes/NE2/BEE007%20BIO%20MEDICAL%20INSTRUMENTATION.pdf>
* <https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SIC1311.pdf>
* <https://www.youtube.com/playlist?list=PL1-PpkqcSWX4qNiSxizLIZK_hogj34UxX>
* <https://www.youtube.com/watch?v=AfQxyVuLeCs>
* <https://github.com/mendes-davi/biomedical-signal-processing>
* <https://kanchiuniv.ac.in/wp-content/uploads/2022/02/III-YEAR-MECHATRONICS-BMI-Course-Material-.pdf>
* <https://peterhcharlton.github.io/post/open_bsp/>
* <https://www.youtube.com/playlist?list=PLxuejeK2BP_d5pCXQVfpTbw2kGGPj8PdV>
* <https://www.egr.msu.edu/classes/ece445/mason/Files/2-Basics_ch1.pdf>
* <https://www.youtube.com/watch?v=8gRYHMNh_Uo>
* <https://www.youtube.com/playlist?list=PLdnqjKaksr8qQ9w3XY5zFXQ2H-zXQFMlI>
* <https://www.youtube.com/playlist?list=PL0o_zxa4K1BV9E-N8tSExU1djL6slnjbL>
* <https://www.youtube.com/playlist?list=PLFF553CED56CDE25D>
* <https://www.youtube.com/watch?v=JHyprRSbJwg>
* <http://www.dissidents.com/resources/DCElectricalCircuitAnalysis.pdf>
* <https://mds.marshall.edu/oa-textbooks/767/>
* <https://open.umn.edu/opentextbooks/textbooks/534>
* <https://charuslukv.files.wordpress.com/2020/09/lecture-2-introduction-to-biomedical-instrumenation.pdf>
* <https://github.com/parvathi25/Biomedical-Signal-Processing>
* <https://github.com/topics/biomedical-signal-processing>
* <https://github.com/topics/biomedical-signal>
* <https://freecomputerbooks.com/DC-Electrical-Circuit-Analysis-A-Practical-Approach.html>
* <https://www.cedengineering.com/userfiles/E07-001%20-%20Electrical%20Engineering%20Fundamentals%20-%20DC%20Circuit%20Analysis%20-%20US.pdf>
* <https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SBMA1503.pdf>
* <https://www2.mvcc.edu/users/faculty/jfiore/freebooks.html>
* <https://nhm.gov.in/New_Updates_2018/NHM_Components/Health_System_Stregthening/Comprehensive_primary_health_care/letter/BMMP_Technical%20Manual.pdf>
* <https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SBM1301.pdf>
* <https://www.worldradiohistory.com/BOOKSHELF-ARH/Technology/Rider-Books/D-C%20Circuit%20Analysis%20-%20Alexander%20Schure.pdf>
* <http://demo.bharathuniv.ac.in/BIHER/bck/page_images/pdf/courseware_eee/Lessonplan/non_major__elective_2/1.BEE%20007%20BIO%20MEDICAL%20INSTRUMENTATION.pdf>
* <https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SBMA5202.pdf>
* <https://zealpolytechnic.com/wp-content/uploads/2023/04/Electrical-Circuit-Analysis-Network-Theory.pdf>
* <https://www.bharathuniv.ac.in/page_images/pdf/7.%20BBT102%20BIO%20Lesson%20Plan%202017.pdf>
* <https://www.scribd.com/document/461808202/note-1469519131-PDF-pdf>
* <https://www.bharathuniv.ac.in/colleges1/downloads/courseware_ece/lesson_plan/BBM054%20-%20LP-%20bioinfor.pdf>
* Society for Neuroscience's *Brain Facts*: Primer on brain/nervous system with psych underpinnings.[macmillanlearning](https://community.macmillanlearning.com/t5/psychology-blog/free-resources-neuroscience-and-i-o/ba-p/21900)​
* Open Culture's free psych/neuro courses: Yale, MIT, UChicago lectures on brain and behavior.[openculture](https://www.openculture.com/psychology_free_courses)​
* Simply Neuroscience resources: Free educational materials for all levels.[simplyneuroscience](https://www.simplyneuroscience.org/resources)​

Direct links: [Brain Facts](https://www.brainfacts.org/the-brain-facts-book), [Open Culture](https://www.openculture.com/psychology_free_courses), [Simply Neuroscience](https://www.simplyneuroscience.org/resources).[simplyneuroscience](https://www.simplyneuroscience.org/resources)​

1. <https://neuronline.sfn.org/training/open-access-textbook-for-neuroscience-learning>
2. <https://pmc.ncbi.nlm.nih.gov/articles/PMC10653246/>
3. <https://open.umn.edu/opentextbooks/textbooks/1303>
4. <https://pressbooks.atlanticoer-relatlantique.ca/intropsychneuro/>
5. <https://pll.harvard.edu/course/fundamentals-neuroscience-part-1-electrical-properties-neuron>
6. <https://pll.harvard.edu/subject/neuroscience>
7. <https://www.coursera.org/learn/neurobiology>
8. <https://www.edx.org/learn/neuroscience/university-of-alaska-fairbanks-behavioral-neuroscience-foundations-of-compulsive-behaviors>
9. <https://www.my-mooc.com/en/mooc/medicalneuro-f8e332be-a442-457b-b91e-3fea57c128f7>
10. <https://community.macmillanlearning.com/t5/psychology-blog/free-resources-neuroscience-and-i-o/ba-p/21900>
11. <https://www.openculture.com/psychology_free_courses>
12. <https://www.simplyneuroscience.org/resources>
13. <https://www.stratleader.net/neuroscience-resources>
14. <https://library.fiu.edu/PSB3101>
15. <https://www.psychology.org/resources/free-online-psychology-courses/>
16. <https://neurosciencenews.com/free-neuroscience-moocs/>
17. <https://open.umn.edu/opentextbooks/textbooks/neuroscience-psychology-and-conflict-management>
18. <http://topix.teachpsych.org/Neuroscience-in-the-Classroom>
19. <https://via.library.depaul.edu/cshtextbooks/2/>
20. <https://sites.google.com/swbgs.com/psychologydept/extra-curricular/moocs>

## **MATHEMATICS**

### **Linear Algebra**

* **MIT 18.06** - Linear Algebra (Gilbert Strang)  
  + Course Page: https://ocw.mit.edu/courses/18-06-linear-algebra-spring-2010/
  + YouTube Videos: https://ocw.mit.edu/1806videos
  + Complete 35-lecture series, problem sets, exams
* **MIT 18.06SC** - Linear Algebra (OCW Scholar)  
  + Course Page: https://ocw.mit.edu/courses/18-06sc-linear-algebra-fall-2011/
  + YouTube Videos: https://ocw.mit.edu/1806scvideos
  + Includes TA problem-solving videos
* **Gilbert Strang's Homepage** (textbook chapters & resources)  
  + URL: https://math.mit.edu/~gs/
  + Introduction to Linear Algebra 5th Edition: https://math.mit.edu/~gs/linearalgebra/
  + Introduction to Linear Algebra 6th Edition: https://math.mit.edu/~gs/linearalgebra/ila6/indexila6.html
  + Selected chapters free, full textbook with video lectures
  + Free PDF preview (first chapter): Available on website

### **Differential Equations**

* **MIT 18.03** - Differential Equations  
  + Course Page: https://ocw.mit.edu/courses/18-03-differential-equations-spring-2010/
  + Video lectures by Prof. Arthur Mattuck (Spring 2003)
  + Complete lecture notes, problem sets with solutions, exams
* **MIT 18.03SC** - Differential Equations (OCW Scholar)  
  + Course Page: https://ocw.mit.edu/courses/18-03sc-differential-equations-fall-2011/
  + Enhanced with recitation videos, Java demonstrations (Mathlets)
* **Learn Differential Equations** (Gilbert Strang & Cleve Moler)  
  + 55 video series exploring DEs and Linear Algebra together
  + Available on MIT OCW and MathWorks
* **Paul's Online Math Notes** - Differential Equations  
  + URL: https://tutorial.math.lamar.edu/Classes/DE/DE.aspx
  + Comprehensive tutorials, examples, practice problems

### **Partial Differential Equations**

* **MIT 18.152** - Introduction to Partial Differential Equations
  + Course Page: https://ocw.mit.edu/courses/18-152-introduction-to-partial-differential-equations-fall-2011/

### **Numerical Analysis**

* **MIT 18.330** - Introduction to Numerical Analysis  
  + Course Page: https://ocw.mit.edu/courses/18-330-introduction-to-numerical-analysis-spring-2012/
  + Covers root finding, interpolation, integration, differential equations
* **MIT 18.335J** - Introduction to Numerical Methods  
  + Course Page: https://ocw.mit.edu/courses/18-335j-introduction-to-numerical-methods-spring-2019/
  + Uses Trefethen & Bau's "Numerical Linear Algebra" textbook
  + GitHub repository available

### **Probability & Statistics**

* **MIT 18.05** - Introduction to Probability and Statistics  
  + Course Page: https://ocw.mit.edu/courses/18-05-introduction-to-probability-and-statistics-spring-2014/
  + Bayesian inference, hypothesis testing, confidence intervals, regression
* **MIT RES.6-012** - Introduction to Probability  
  + Course Page: https://ocw.mit.edu/courses/res-6-012-introduction-to-probability-spring-2018/
  + Video lectures by Prof. John Tsitsiklis
  + Developed for edX

### **Math Foundations/Proofs**

* **MIT 6.042J** - Mathematics for Computer Science
  + Course Page: https://ocw.mit.edu/courses/6-042j-mathematics-for-computer-science-spring-2015/
  + Discrete math, proofs, graph theory, probability

## **CHEMISTRY**

### **Physical Chemistry & Thermodynamics**

* **LibreTexts Physical Chemistry**
  + Main Bookshelves Page: https://chem.libretexts.org/Bookshelves
  + Physical & Theoretical Chemistry: https://chem.libretexts.org/Bookshelves/Physical\_and\_Theoretical\_Chemistry\_Textbook\_Maps
  + Multiple complete textbooks covering thermodynamics, quantum chemistry, statistical mechanics
* **DeVoe's "Thermodynamics and Chemistry"** (Free textbook)  
  + URL: https://chem.libretexts.org/Bookshelves/Physical\_and\_Theoretical\_Chemistry\_Textbook\_Maps/Thermodynamics\_and\_Chemical\_Equilibrium\_(DeVoe)
  + Graduate-level classical chemical thermodynamics

### **Organic Chemistry**

* **LibreTexts Organic Chemistry**
  + Main Organic Chemistry Page: https://chem.libretexts.org/Bookshelves/Organic\_Chemistry
  + Multiple complete textbooks covering structure, properties, reactions
  + "Organic Chemistry with a Biological Emphasis" (Soderberg): https://chem.libretexts.org/Bookshelves/Organic\_Chemistry/Book:*Organic\_Chemistry\_with\_a\_Biological\_Emphasis\_v2.0*(Soderberg)
* **Yale University** - Freshman Organic Chemistry I & II  
  + Available on YouTube: Search "Yale Organic Chemistry J. Michael McBride"
* **Khan Academy** - Organic Chemistry  
  + URL: https://www.khanacademy.org/science/organic-chemistry
* **Virtual Textbook of Organic Chemistry** (Dr. William Reusch)  
  + URL: https://www2.chemistry.msu.edu/faculty/reusch/VirtTxtJml/intro1.htm

### **Biochemistry**

* **MIT 7.05** - General Biochemistry  
  + Course Page: https://ocw.mit.edu/courses/7-05-general-biochemistry-spring-2020/
  + Covers cell chemistry, enzymology, macromolecular synthesis, metabolism
* **MIT 5.07SC** - Biological Chemistry I  
  + Course Page: https://ocw.mit.edu/courses/5-07sc-biological-chemistry-i-fall-2013/
  + OCW Scholar format
* **Oregon State** - Biochemistry Free and Easy  
  + URL: https://open.oregonstate.education/biochemistry/
  + Three free online biochemistry books
* **LibreTexts Biology** - Biochemistry Section  
  + URL: https://bio.libretexts.org/Bookshelves/Biochemistry

## **NEUROSCIENCE, COGNITION, & BEHAVIOR**

### **Neuroscience**

* **MIT 9.01** - Introduction to Neuroscience  
  + Course Page: https://ocw.mit.edu/courses/9-01-introduction-to-neuroscience-fall-2007/
  + Neuroanatomy, neurophysiology, sensory/motor systems
* **MIT 9.10** - Cognitive Neuroscience  
  + Course Page: https://ocw.mit.edu/courses/9-10-cognitive-neuroscience-spring-2006/
* **MIT 9.13** - The Human Brain  
  + Course Page: https://ocw.mit.edu/courses/9-13-the-human-brain-spring-2019/
  + Core perceptual/cognitive abilities and brain implementation
  + Lecture videos and assignments
* **MIT 9.40** - Introduction to Neural Computation  
  + Course Page: https://ocw.mit.edu/courses/9-40-introduction-to-neural-computation-spring-2018/

### **Cognitive Science & Psychology**

* **MIT 9.00SC** - Introduction to Psychology
  + Course Page: https://ocw.mit.edu/courses/9-00sc-introduction-to-psychology-fall-2011/
  + Full lecture videos, free online textbook
  + Covers perception, emotion, learning, memory, cognition, development

### **Computational Neuroscience**

* **MIT 9.29J** - Introduction to Computational Neuroscience
  + Course Page: https://ocw.mit.edu/courses/9-29j-introduction-to-computational-neuroscience-spring-2004/
  + Signal detection, probability, information theory, neural coding

### **Brain-Computer Interfaces**

* **Rajesh Rao** - "Brain-Computer Interfacing: An Introduction"  
  + Comprehensive BCI textbook
* **Springer** - "Neural Engineering" 3rd Edition (edited by Bin He)
* **MIT Press** - "Toward Brain-Computer Interfacing"

### **Educational Resources**

## **Free Textbooks**

Open-access neuroscience textbooks tailored for psychology contexts provide foundational knowledge on brain structure, function, and behavior.

* *Introduction to Behavioral Neuroscience* by Ohio State University and Auburn College: Covers cellular anatomy to executive function, ideal for entry-level psychology courses.[neuronline.sfn](https://neuronline.sfn.org/training/open-access-textbook-for-neuroscience-learning)​
* *Neuroscience: 2nd Canadian Edition* and *Neuroscience Online* by UT Health Science Center: Comprehensive overviews of neural form, function, and behavioral links.[pmc.ncbi.nlm.nih](https://pmc.ncbi.nlm.nih.gov/articles/PMC10653246/)​
* *Introduction to Neuroscience* by Michigan State University: Targets introductory courses with psychology-relevant topics.[open.umn](https://open.umn.edu/opentextbooks/textbooks/1303)​
* *Introduction to Psychology & Neuroscience (2nd Edition)*: OpenStax adaptation blending psych and neuro basics.[pressbooks.atlanticoer-relatlantique](https://pressbooks.atlanticoer-relatlantique.ca/intropsychneuro/)​

Direct links: [OpenStax Behavioral Neuroscience](https://openstax.org/details/books/introduction-behavioral-neuroscience), [Neuroscience Online](https://nba.uth.tmc.edu/neuroscience/), [MSU Intro Neuroscience](https://open.umn.edu/opentextbooks/textbooks/1303), [Psychology & Neuroscience](https://pressbooks.atlanticoer-relatlantique.ca/intropsychneuro/).

## **Online Courses and MOOCs**

Free MOOCs from top universities emphasize neuroscience's role in psychology, such as behavior, memory, and disorders.

* Harvard's *Fundamentals of Neuroscience* series (Parts 1-3): Explores neuron electrical properties, networks, and brain imaging.[pll.harvard+1](https://pll.harvard.edu/course/fundamentals-neuroscience-part-1-electrical-properties-neuron)​
* Coursera's *Understanding the Brain: The Neurobiology of Everyday Life* (UChicago): Links neural processes to daily behaviors.[coursera](https://www.coursera.org/learn/neurobiology)​
* edX's *Behavioral Neuroscience: Foundations of Compulsive Behaviors* (U Alaska): Covers research on behavior using lab models.[edx](https://www.edx.org/learn/neuroscience/university-of-alaska-fairbanks-behavioral-neuroscience-foundations-of-compulsive-behaviors)​
* Duke's *Medical Neuroscience*: Functional organization and neurophysiology with psych applications.[my-mooc](https://www.my-mooc.com/en/mooc/medicalneuro-f8e332be-a442-457b-b91e-3fea57c128f7)​

Direct links: [Harvard Part 1](https://pll.harvard.edu/course/fundamentals-neuroscience-part-1-electrical-properties-neuron), [UChicago Coursera](https://www.coursera.org/learn/neurobiology), [edX Behavioral Neuro](https://www.edx.org/learn/neuroscience/university-of-alaska-fairbanks-behavioral-neuroscience-foundations-of-compulsive-behavior), [Medical Neuroscience](https://www.my-mooc.com/en/mooc/medicalneuro-f8e332be-a442-457b-b91e-3fea57c128f7).

## **Additional Academic Resources**

Curated sites offer videos, interactive tools, and primers for psychology-focused neuroscience study.

* Society for Neuroscience's *Brain Facts*: Primer on brain/nervous system with psych underpinnings.[macmillanlearning](https://community.macmillanlearning.com/t5/psychology-blog/free-resources-neuroscience-and-i-o/ba-p/21900)​
* Open Culture's free psych/neuro courses: Yale, MIT, UChicago lectures on brain and behavior.[openculture](https://www.openculture.com/psychology_free_courses)​
* Simply Neuroscience resources: Free educational materials for all levels.[simplyneuroscience](https://www.simplyneuroscience.org/resources)​

Direct links: [Brain Facts](https://www.brainfacts.org/the-brain-facts-book), [Open Culture](https://www.openculture.com/psychology_free_courses), [Simply Neuroscience](https://www.simplyneuroscience.org/resources).[simplyneuroscience](https://www.simplyneuroscience.org/resources)​

* <https://neuronline.sfn.org/training/open-access-textbook-for-neuroscience-learning>
* <https://pmc.ncbi.nlm.nih.gov/articles/PMC10653246/>
* <https://open.umn.edu/opentextbooks/textbooks/1303>
* <https://pressbooks.atlanticoer-relatlantique.ca/intropsychneuro/>
* <https://pll.harvard.edu/course/fundamentals-neuroscience-part-1-electrical-properties-neuron>
* <https://pll.harvard.edu/subject/neuroscience>
* <https://www.coursera.org/learn/neurobiology>
* <https://www.edx.org/learn/neuroscience/university-of-alaska-fairbanks-behavioral-neuroscience-foundations-of-compulsive-behaviors>
* <https://www.my-mooc.com/en/mooc/medicalneuro-f8e332be-a442-457b-b91e-3fea57c128f7>
* <https://community.macmillanlearning.com/t5/psychology-blog/free-resources-neuroscience-and-i-o/ba-p/21900>
* <https://www.openculture.com/psychology_free_courses>
* <https://www.simplyneuroscience.org/resources>
* <https://www.stratleader.net/neuroscience-resources>
* <https://library.fiu.edu/PSB3101>
* <https://www.psychology.org/resources/free-online-psychology-courses/>
* <https://neurosciencenews.com/free-neuroscience-moocs/>
* <https://open.umn.edu/opentextbooks/textbooks/neuroscience-psychology-and-conflict-management>
* <http://topix.teachpsych.org/Neuroscience-in-the-Classroom>
* <https://via.library.depaul.edu/cshtextbooks/2/>
* <https://sites.google.com/swbgs.com/psychologydept/extra-curricular/moocs>
* **Backyard Brains**
  + URL: https://backyardbrains.com
  + Free lesson plans on electrophysiology and neuroprosthetics
* **Frontiers for Young Minds** - BCI Articles  
  + Search their site for student-friendly BCI content

## **Textbook Libraries**

* **LibreTexts** - Open textbooks across all sciences
  + Chemistry: https://chem.libretexts.org
  + Biology: https://bio.libretexts.org
  + Math: https://math.libretexts.org
  + Physics: https://phys.libretexts.org
  + Complete bookshelves with hundreds of free textbooks

### **Video Lecture Collections**

* **MIT OpenCourseWare**: https://ocw.mit.edu (2,500+ courses)
* **Stanford Online**: https://online.stanford.edu
* **Khan Academy**: https://www.khanacademy.org
* **Coursera**: https://www.coursera.org (audit for free)
* **edX**: https://www.edx.org (audit for free)
* **Class Central** (MOOC aggregator): https://www.classcentral.com

### **GitHub Aggregators**

* **OSSU (Open Source Society University)**
  + Computer Science: https://github.com/ossu/computer-science
  + Data Science: https://github.com/ossu/data-science
  + Bioinformatics: https://github.com/ossu/bioinformatics
* **Awesome Lists**
  + Awesome Courses: https://github.com/prakhar1989/awesome-courses
  + CS Video Courses: https://github.com/Developer-Y/cs-video-courses
  + Awesome CS Opportunities: https://github.com/anu0012/awesome-computer-science-opportunities

**Effective Search Terms**

1. **"[Subject] MIT OCW"** → Find MIT courses
2. **"[Subject] LibreTexts"** → Find open textbooks
3. **"[Subject] GitHub awesome"** → Find curated lists
4. **"[Professor name] YouTube"** → Find lecture series
5. **"[University] [Course Number] site:edu"** → Find specific course pages

### **Finding Old Exams & Homework**

* Search: **"[University] [Course] past exams"**
* Search: **"[University] [Course] homework solutions"**
* Check course websites directly (often linked from OCW or GitHub)

### **Reddit Communities**

* r/learnprogramming
* r/learnmath
* r/chemistry
* r/neuroscience
* r/AskComputerScience

### **Practice Problem Resources**

* **Project Euler**: https://projecteuler.net (math + CS problems)
* **LeetCode**: https://leetcode.com (coding practice)
* **HackerRank**: https://www.hackerrank.com
* **Paul's Online Math Notes**: https://tutorial.math.lamar.edu (all math levels)

**Mathematics**

* Gilbert Strang - "Introduction to Linear Algebra" (selected chapters free)
* Gilbert Strang - "Differential Equations and Linear Algebra"
* Bertsekas & Tsitsiklis - "Introduction to Probability"

### **Computer Science**

* Available through university libraries or online searches

### **Chemistry**

* Howard DeVoe - "Thermodynamics and Chemistry" (free on LibreTexts)
* Multiple free organic chemistry textbooks (LibreTexts)

# **✅ PROJECTS BY TRACK → THEN BY COURSE**

Each course gets:

* **Beginner Project (Level 1)**
* **Intermediate Project (Level 2)**
* **Advanced Project (Level 3)**

# **🧮 MATH TRACK — Projects**

## **Linear Algebra**

**1️⃣ Level 1:** Matrix Calculator  
 Build a small Python/JS tool that computes matrix inverse, determinant, eigenvalues.

**2️⃣ Level 2:** Image Compression with SVD  
 Implement SVD to compress an image and show before/after.

**3️⃣ Level 3:** PCA from Scratch  
 Use PCA to reduce dimensionality in a real dataset (e.g., MNIST, EEG).

## **Math Foundations / Logic / Proofs**

**1️⃣ Level 1:** Write 10 proofs (direct, contrapositive, contradiction).  
 **2️⃣ Level 2:** Build a truth-table generator (JS or Python).  
 **3️⃣ Level 3:** Implement a SAT Solver (DPLL) in Python.

## **Probability & Statistics**

**1️⃣ Level 1:** Simulate coin flips, dice, Bayesian inference.  
 **2️⃣ Level 2:** Build a statistical dashboard for real data (weather, stocks).  
 **3️⃣ Level 3:** Implement a full Monte Carlo simulation engine.

## **Calculus / Multivariable**

**1️⃣ Level 1:** Visualize gradients and surfaces in MATLAB/Python.  
 **2️⃣ Level 2:** Optimize a multivariable function using gradient descent.  
 **3️⃣ Level 3:** Simulate a physical system (pendulum, mass-spring) using calculus.

## **Differential Equations**

**1️⃣ Level 1:** Solve ODEs with Python (Euler, RK4).  
 **2️⃣ Level 2:** Model population dynamics (logistic, predator-prey).  
 **3️⃣ Level 3:** Build your own ODE solver library.

## **Partial Differential Equations (PDEs)**

**1️⃣ Level 1:** Simulate heat equation (1D).  
 **2️⃣ Level 2:** Simulate wave equation (2D).  
 **3️⃣ Level 3:** Build PDE-based neural net (PINNs) for physics modeling.

## **Discrete Math**

**1️⃣ Level 1:** Graph traversal visualizer (DFS/BFS).  
 **2️⃣ Level 2:** Build a combinatorics calculator.  
 **3️⃣ Level 3:** Build a graph-theory–based routing algorithm.

## **Numerical Analysis**

**1️⃣ Level 1:** Implement numerical integration methods.  
 **2️⃣ Level 2:** Build root-finding tools (Newton’s method, bisection).  
 **3️⃣ Level 3:** Simulate a chaotic system (Lorenz attractor) numerically.

# **💻 CS TRACK — Projects**

## **Programming Foundations**

**1️⃣ Level 1:** Build a CLI calculator (Python).  
 **2️⃣ Level 2:** Build a unit-converter web app.  
 **3️⃣ Level 3:** Build an API-based dashboard (weather, crypto, finance).

## **Data Structures & Algorithms**

**1️⃣ Level 1:** Implement basic DS (stack, queue, linked list).  
 **2️⃣ Level 2:** Implement sorting visualizer.  
 **3️⃣ Level 3:** Build a pathfinding simulator (A\*, Dijkstra).

## **Computer Architecture**

**1️⃣ Level 1:** Build a simple simulator for binary → decimal.  
 **2️⃣ Level 2:** CPU instruction decoder (simulate small ISA).  
 **3️⃣ Level 3:** Build a mini virtual machine (registers, stack, ops).

## **Operating Systems**

**1️⃣ Level 1:** Simulate scheduling algorithms (RR, FCFS).  
 **2️⃣ Level 2:** Build a memory allocator simulation.  
 **3️⃣ Level 3:** Build a toy shell (cd, ls, run commands).

## **Computer Networks**

**1️⃣ Level 1:** Packet inspector tool (parse headers).  
 **2️⃣ Level 2:** Build a chat app using sockets.  
 **3️⃣ Level 3:** Build your own TCP-like protocol in Python.

# **🧑‍💻 SOFTWARE ENGINEERING + FULL-STACK TRACK — Projects**

## **Frontend**

**1️⃣ Level 1:** Responsive landing page (HTML/CSS).  
 **2️⃣ Level 2:** React component library with reusable UI elements.  
 **3️⃣ Level 3:** Full UI clone (Spotify, Netflix, Notion).

## **Backend**

**1️⃣ Level 1:** REST API (Node/Express).  
 **2️⃣ Level 2:** JWT Authentication system.  
 **3️⃣ Level 3:** Microservice architecture with Redis/Postgres.

## **Databases**

**1️⃣ Level 1:** Build a student database CRUD app.  
 **2️⃣ Level 2:** Create relational schemas for a real project.  
 **3️⃣ Level 3:** Build your own ORM-like query builder.

## **DevOps**

**1️⃣ Level 1:** Deploy site to Netlify/Vercel.  
 **2️⃣ Level 2:** Create CI/CD pipeline with GitHub Actions.  
 **3️⃣ Level 3:** Dockerize a full-stack app + deploy to cloud.

# **🧠 NEUROSCIENCE / NEURAL ENGINEERING TRACK — Projects**

## **Intro Neuroscience**

**1️⃣ Level 1:** Create labeled diagrams of neural structures.  
 **2️⃣ Level 2:** Build a neural pathway simulator.  
 **3️⃣ Level 3:** Build an app that visualizes EEG frequency bands.

## **Neural Engineering**

**1️⃣ Level 1:** Build a spike-sorting algorithm (basic thresholding).  
 **2️⃣ Level 2:** Implement signal filtering for neural data (Butterworth/IIR).  
 **3️⃣ Level 3:** Build a simplified brain–computer–interface (BCI) prototype.

## **Neural Signal Acquisition**

**1️⃣ Level 1:** Simulate recording noise and filtering.  
 **2️⃣ Level 2:** Build a Python EEG/EMG signal processing toolkit.  
 **3️⃣ Level 3:** Real-time acquisition pipeline (Arduino + Python).

## **Neural Data Analysis**

**1️⃣ Level 1:** Plot PSTHs and spike rasters from datasets.  
 **2️⃣ Level 2:** Build a neural decoding classifier (SVM or kNN).  
 **3️⃣ Level 3:** Build a deep-learning decoder (CNN/RNN) for neural data.

## **Neuro Sensory Engineering**

**1️⃣ Level 1:** Model basic sensory transduction pathways.  
 **2️⃣ Level 2:** Create a prosthetic sensor simulation (light/touch).  
 **3️⃣ Level 3:** Build a multi-sensory integration model using ML.

# **⚗️ CHEMISTRY TRACK — Projects**

## **General / Inorganic Chemistry**

**1️⃣ Level 1:** Build a periodic-table explorer app.  
 **2️⃣ Level 2:** Chemical reaction balancer engine.  
 **3️⃣ Level 3:** Molecular orbital visualizer.

## **Organic Chemistry**

**1️⃣ Level 1:** Reaction mechanism flashcards app.  
 **2️⃣ Level 2:** Build SMILES → molecule converter using RDKit.  
 **3️⃣ Level 3:** Predict reaction outcomes with ML.

## **Biochemistry**

**1️⃣ Level 1:** Draw metabolic pathway maps.  
 **2️⃣ Level 2:** Build enzyme kinetics calculator (MM, LB).  
 **3️⃣ Level 3:** Model a signaling pathway computationally.

## **Thermodynamics**

**1️⃣ Level 1:** Implement ideal-gas law calculator.  
 **2️⃣ Level 2:** Create thermodynamic diagrams (PV, TS, HS).  
 **3️⃣ Level 3:** Build a system simulator (heat engine, refrigeration cycle).

## **Physical Chemistry**

**1️⃣ Level 1:** Quantum particle in a box visualizer.  
 **2️⃣ Level 2:** Spectroscopy line simulator.  
 **3️⃣ Level 3:** Molecular dynamics simulation (small atoms system).

# **⚡ ELECTRICAL ENGINEERING / SIGNALS / BME TRACK — Projects**

## **Circuits**

**1️⃣ Level 1:** Ohm’s Law calculator + resistor color code app.  
 **2️⃣ Level 2:** Simulate RC/RL circuits in Python.  
 **3️⃣ Level 3:** Build your own SPICE-like mini-simulator.

## **Signals & Systems**

**1️⃣ Level 1:** Build sine, square, triangle signal generator.  
 **2️⃣ Level 2:** Fourier transform visualizer.  
 **3️⃣ Level 3:** LTI system simulator + convolution engine.

## **DSP**

**1️⃣ Level 1:** Filtering demo (low-pass, high-pass).  
 **2️⃣ Level 2:** Audio equalizer app.  
 **3️⃣ Level 3:** Build a real-time DSP chain (Python or embedded).

## **Control Theory**

**1️⃣ Level 1:** PID controller simulation.  
 **2️⃣ Level 2:** Cruise-control system modeling.  
 **3️⃣ Level 3:** Quadrotor or robot arm controller.

## **Biomedical Engineering**

**1️⃣ Level 1:** Heart-rate detection from PPG signals.  
 **2️⃣ Level 2:** Build a gait analysis classifier.  
 **3️⃣ Level 3:** Build a wearable symptom tracker (Arduino + ML).

Here are solid, free, academic-style resources mapped to the key sophomore/junior EE topics you listed: YouTube, playlists, GitHub, and textbooks/notes, plus a bit of usage advice.

## **Embedded systems / digital / microcontrollers**

* GitHub roadmaps and courses:
  + Modern Embedded Systems Programming Course (C on ARM Cortex‑M, very in-depth, with full examples and explanations).[github](https://github.com/QuantumLeaps/modern-embedded-programming-course)​
  + Learn Embedded Systems curated resource list (links to books, courses, and tools).[github](https://github.com/erinjense/Learn-Embedded-Systems)​
  + Embedded Systems Engineering Roadmap (structured skill roadmap with modern resources, good for long-term planning).[github](https://github.com/m3y54m/Embedded-Engineering-Roadmap)​
  + Arm University “Embedded Systems Fundamentals” and “Efficient Embedded Systems Design” kits (textbook + lab material around Arm cores).[github+1](https://github.com/arm-university/Embedded-Systems-Fundamentals)​
* Course-style material:
  + Brown’s Embedded and Real‑Time Software (CSCI 1600) public site with schedule, readings, and labs; focus on real‑time and low‑level C.[brown-cs1600.github](https://brown-cs1600.github.io/)​
  + GitHub repos mirroring Coursera “Introduction to Embedded Systems Software and Development Environments” (notes + assignments if you don’t want to enroll).[github+1](https://github.com/renatosoriano/Coursera_Introduction-to-Embedded-Systems-Software-and-Development-Environments)​

Usage advice: For embedded, pair one structured course (e.g., Arm kit or Coursera notes) with a personal microcontroller project and use the roadmaps as your checklist. Treat C, build systems, and debugging as non‑negotiable fundamentals.

## **Communication systems**

* YouTube / playlists:
  + “Communication Systems” undergraduate playlist with full lecture sequence (modulation, noise, performance) suitable for an EE comms class.[youtube](https://www.youtube.com/playlist?list=PLGtVq7DEEogZk2DPF5muPRV4p9Q4-UIy5)​
  + Intro videos on communication system block diagrams and basics for quick conceptual review.youtube+1​
  + Another instructor-led “Communication System” playlist that explicitly follows a syllabus and uses MATLAB/Simulink in some examples.youtube​
* Notes and advice:
  + MIT OCW’s “Introduction to Electric Power Systems” readings include AC network and power‑flow chapters that overlap with some comms‑related network theory and are good for sharpening phasor and complex power intuition.[ocw.mit](https://ocw.mit.edu/courses/6-061-introduction-to-electric-power-systems-spring-2011/pages/readings/)​
  + Reddit threads where EE students recommend specific comms channels (good for discovering niche, high-quality playlists on PSK/FSK/ASK and PSD).[reddit](https://www.reddit.com/r/ElectricalEngineering/comments/ipnkfw/youtube_videos_for_communication_systems/)​

Usage advice: For self-study, anchor on a single playlist that actually follows a textbook and do problem sets from any standard comms text you can legally access. Re-derive key results (AM/PM/FM spectra, SNR, BER expressions) rather than memorizing formulas.

## **Power systems**

* Course notes / textbooks:
  + Baosen Zhang’s Power Systems Analysis course page (annotated slides and recorded lectures covering transformers, lines, power flow, and stability).[zhangbaosen.github](https://zhangbaosen.github.io/teaching/EE454)​
  + MIT OCW “Introduction to Electric Power Systems” notes (free, topic-ordered PDF chapters on network theory, AC power flow, polyphase systems, load flow, and symmetrical components).[ocw.mit](https://ocw.mit.edu/courses/6-061-introduction-to-electric-power-systems-spring-2011/pages/readings/)​
  + “Electrical Power Systems” text provided by Dronacharya College of Engineering (covers transmission, distribution, and system studies in a single free PDF).[ggnindia.dronacharya](https://ggnindia.dronacharya.info/Downloads/Sub-info/RelatedBook/4thSem/Transmission-and-distribution-text-book-2.pdf)​
  + Power Systems lecture‑note PDFs from other universities (e.g., “Power System Engineering II”, “POWER SYSTEMS‑III” notes) for additional worked derivations and examples.[mrcet+1](https://mrcet.com/downloads/digital_notes/EEE/04012023/POWER%20SYSTEMS-III%20DITITAL%20NOTES.pdf)​

Usage advice: Treat per‑unit, three‑phase, and load‑flow basics as the core. Work through the OCW chapters in order, then skim alternative note sets for extra solved problems. Focus on getting completely fluent with phasors and complex power.

## **Probability and random processes (for EEs)**

* Free textbooks / references:
  + “Probability, Statistics, and Random Processes for Electrical Engineering” (Leon‑Garcia) is widely used; there are PDF copies online, but you should verify that any copy you use is legally shared and respect copyright.[convexoptimization+1](https://convexoptimization.com/TOOLS/Leon-Garcia.pdf)​
  + Archive.org entries like “Probability and Random Processes for Electrical Engineering” provide borrowable scans you can access for free with an account, which is typically a more clearly legitimate route.[archive](https://archive.org/details/probabilityrando0000leon_x2a6)​
* General advice:
  + Many “Probability and Random Processes for ECE” PDFs floating around are uploaded without clear rights; it is better to use library/Archive.org or openly licensed lecture notes when possible and avoid distributing copyrighted texts. Respecting intellectual property is essential, even when material is easy to download.[pdfcoffee](https://pdfcoffee.com/probability-and-random-processes-for-electrical-engineering-2nd-ed-4-pdf-free.html)​

Usage advice: Work probability in parallel with signals/comms. Treat random variables and random processes as tools: every new piece of theory should immediately be tied to a communication, detection, or noise example to stick.

## **Signals and systems**

* YouTube / playlists:
  + Neso Academy’s “Signals and Systems” series (hundreds of short lectures covering essentially the whole undergraduate curriculum: classifications, convolution, Fourier/Laplace, sampling, etc.).youtube​[reddit](https://www.reddit.com/r/Btechtards/comments/1709mut/ece_bros_pls_help_are_there_any_good_yt_playlists/)​
  + MIT OCW “6.003 Signals and Systems” full lecture series on YouTube (high‑concept, rigorous MIT perspective; great for intuition and math maturity).youtube​
  + Additional undergraduate signals and systems playlists, including one explicitly labeled for BME students and others that walk through core concepts stepwise.[youtube+2](https://www.youtube.com/playlist?list=PLBlnK6fEyqRhG6s3jYIU48CqsT5cyiDTO)​

Usage advice: Use one detailed playlist (e.g., Neso) as your “workhorse” and the MIT course for deeper understanding. Solve problems from any standard signals text after each video; doing convolution and transform problems by hand is non‑negotiable.

## **Analog electronics / circuits**

* Free/academic textbooks:
  + “Foundations of Analog and Digital Electronic Circuits” by Agarwal & Lang (MIT) — a comprehensive first‑course text that blends circuit analysis with analog/digital devices; freely available via MIT-related sources.[neurophysics.ucsd](https://neurophysics.ucsd.edu/courses/physics_120/Agarwal%20and%20Lang%20(2005)%20Foundations%20of%20Analog%20and%20Digital.pdf)​
  + University lecture notes on Analog Electronics (e.g., University of Oregon’s lecture notes, GCE Keonjhar analog circuit notes, and Electronics I notes from Newcastle) give step‑by‑step derivations and worked circuit examples.[pages.uoregon+2](https://pages.uoregon.edu/rayfrey/AnalogNotes.pdf)​
  + Course handouts from MIT’s Introductory Analog Electronics Lab (short PDFs on op‑amps, feedback, filters, and practical issues like decibels and bandwidth).[ocw.mit](https://ocw.mit.edu/courses/6-101-introductory-analog-electronics-laboratory-spring-2007/pages/study-materials/)​
* Notes / summaries:
  + Analog Electronics note sets that summarize diodes, BJTs, MOSFETs, biasing, and small‑signal models can be useful quick references; verify that any PDF repository (e.g., note-sharing sites) is allowed to host the material before relying on it.[scribd+1](https://www.scribd.com/document/839442857/Analog-Electronics-Notes)​

Usage advice: Pick Agarwal & Lang as your theoretical backbone, then supplement with university lab notes to ground it in real circuits and design. Force yourself to design and hand‑analyze simple amplifiers and filters before simulating.

## **How to structure this for your path**

Given your bioengineering + CS + chem stack and your interest in neural/biomedical systems, a pragmatic path over the next 6–12 months would be:

* Signals and Systems:
  + Main: Neso Academy or similar comprehensive playlist.youtube​[youtube](https://www.youtube.com/playlist?list=PLBlnK6fEyqRhG6s3jYIU48CqsT5cyiDTO)​
  + Deep intuition: MIT 6.003 lectures.youtube​
* Probability/Random Processes:
  + Use a standard EE probability text (Leon‑Garcia or similar) via a legal source (library/Archive.org) and tie every chapter back to signals/comms problems.[convexoptimization+1](https://convexoptimization.com/TOOLS/Leon-Garcia.pdf)​
* Analog + Embedded:
  + Theory: Agarwal & Lang (Foundations of Analog and Digital Electronic Circuits).[neurophysics.ucsd](https://neurophysics.ucsd.edu/courses/physics_120/Agarwal%20and%20Lang%20(2005)%20Foundations%20of%20Analog%20and%20Digital.pdf)​
  + Practice: One embedded GitHub course (QuantumLeaps or Arm kits) plus a microcontroller project.[github+2](https://github.com/arm-university/Efficient-Embedded-Systems-Design-Education-Kit)​
* Power/Comms (as electives):
  + Power: MIT OCW power systems notes + Baosen Zhang’s course.[zhangbaosen.github+1](https://zhangbaosen.github.io/teaching/EE454)​
  + Comms: One full YouTube undergraduate comms playlist and associated problem sets.youtube​[youtube](https://www.youtube.com/playlist?list=PLGtVq7DEEogZk2DPF5muPRV4p9Q4-UIy5)​

1. <https://github.com/QuantumLeaps/modern-embedded-programming-course> - github embedded programming course
2. <https://github.com/arm-university/Embedded-Systems-Fundamentals> -github embedded systems fundamentals
3. <https://github.com/arm-university/Efficient-Embedded-Systems-Design-Education-Kit> - github embedded systems design education
4. [https://brown-cs1600.github.io](https://brown-cs1600.github.io/) – brown university embedded systems class
5. <https://github.com/renatosoriano/Coursera_Introduction-to-Embedded-Systems-Software-and-Development-Environments> - github intro to embedded systems and software
6. <https://github.com/MohammAAA/Introduction-to-Embedded-Systems-Software-and-Development-Environments> - github U of Colorado embedded systems and software course
7. <https://www.youtube.com/playlist?list=PLGtVq7DEEogZk2DPF5muPRV4p9Q4-UIy5> - Communication Systems by [AKH](https://www.youtube.com/@AKHassan)
8. <https://www.youtube.com/watch?v=kAs8OerKRmc> **Communication system (Block diagram, Basics, Working, Details & Signal Propagation) Explained by** [Engineering Funda](https://www.youtube.com/@EngineeringFunda)
9. <https://www.youtube.com/watch?v=INn5EQ9l5PE> - **LECT-1 : INTRODUCTION TO COMMUNICATION SYSTEM by** [EPOV CHANNEL](https://www.youtube.com/@epovchannel1960)
10. <https://www.youtube.com/watch?v=CAOqsWLdQqY> - **Introduction to Communication System | A playlist header of the Course | by** [AKH](https://www.youtube.com/@AKHassan)
11. <https://ocw.mit.edu/courses/6-061-introduction-to-electric-power-systems-spring-2011/pages/readings/> - MIT intro to electric power systems
12. Electrical communications systems- https://www.youtube.com/channel/UCCEvi31Q8PAStrWtvJlGiPQ/videos
13. <https://ggnindia.dronacharya.info/Downloads/Sub-info/RelatedBook/4thSem/Transmission-and-distribution-text-book-2.pdf> -electrical power systems book
14. <https://mrcet.com/downloads/digital_notes/EEE/04012023/POWER%20SYSTEMS-III%20DITITAL%20NOTES.pdf> – power systems III book
15. <https://www.vssut.ac.in/lecture_notes/lecture1424265031.pdf> - pdf notes on electrical power systems II
16. <https://convexoptimization.com/TOOLS/Leon-Garcia.pdf> -probability, statistical analysis and random processes for electrical engineering
17. <https://pdfcoffee.com/probability-and-random-processes-for-electrical-engineering-2nd-ed-4-pdf-free.html> – probability, statistical analysis, and random processes for electrical engineering part II
18. <https://www.youtube.com/watch?v=s8rsR_TStaA> - **Introduction to Signals and Systems by neso academy**
19. <https://www.youtube.com/watch?v=-FHm2pQmiSM> - **1. Signals and Systems by** [MIT OpenCourseWare](https://www.youtube.com/@mitocw)
20. <https://www.youtube.com/playlist?list=PLBlnK6fEyqRhG6s3jYIU48CqsT5cyiDTO> -Signals and Systems playlist by [Neso Academy](https://www.youtube.com/@nesoacademy)
21. <https://www.youtube.com/playlist?list=PLCBpeohGG5--k25NLu0-gVvqpAa0jMF-F> **Signals and Systems (Undergraduate) playlist** [by Biomedical Engineering](https://www.youtube.com/@BiomedicalEngineering)
22. <https://www.youtube.com/playlist?list=PLWWf-r6pJvvUB1LV4pcXy76_fzC-hIDQk> - **Signals and Systems: A Comprehensive Playlist for Mastering Core Concepts**[by Mind Matrix Engineering](https://www.youtube.com/@xceltube_education)
23. <https://neurophysics.ucsd.edu/courses/physics_120/Agarwal%20and%20Lang%20(2005)%20Foundations%20of%20Analog%20and%20Digital.pdf> Foundations of Analog and Digital Electronic Circuits
24. <https://pages.uoregon.edu/rayfrey/AnalogNotes.pdf> Lecture Notes for Analog Electronics
25. <http://www.gcekjr.ac.in/pdf/lectures/2021/9313ALL_3rd%20Semester_Electrical%20Engineering.pdf> - LECTURE NOTES ON ANALOG ELECTRONICS CIRCUIT
26. <https://blogs.ncl.ac.uk/stephanelegoff/files/2014/12/EEE1002-EEE1010-Lecture-Notes.pdf> EEE1002/EEE1010 - Electronics I Analogue Electronics Lecture Notes S. Le Goff
27. <https://ocw.mit.edu/courses/6-101-introductory-analog-electronics-laboratory-spring-2007/pages/study-materials/> [Introductory Analog Electronics Laboratory](https://ocw.mit.edu/courses/6-101-introductory-analog-electronics-laboratory-spring-2007/)
28. <https://mrcet.com/downloads/digital_notes/EEE/AE%20DIGITAL%20NOTES.pdf> ANALOG ELECTRONICS II B.TECH I SEMESTER FOR
29. <https://github.com/AbdelrhmanWalaa/NTI-Embedded_Systems_Program> **Embedded Systems Program**
30. <https://github.com/joaocarvalhoopen/How_to_learn_modern_Embedded_Systems> github **How to learn modern Embedded Systems**
31. <https://picture.iczhiku.com/resource/eetop/WYKgHqkPkiWRYmVN.pdf> Probability, Statistics, and Random Processes for Engineers Fourth Edition Henry Stark Illinois Institute of Technology John W. Woods Rensselaer Polytechnic Institute
32. <https://www.youtube.com/watch?v=VtSlmdshqrI> **ECE3084 Signals and Systems: Introduction (Lecture 1, Summer 2020, Georgia Tech Course) by** [Lantertronics](https://www.youtube.com/@Lantertronics)

**Bioengineering Bachelors at fgcu resource pack:**

**Core math (Calc I–III, Diff Eq, Stats)**

* **OpenStax Calculus (Vol. 1–3) – full free calc sequence with problems and solutions.**[**https://openstax.org/subjects/math**](https://openstax.org/subjects/math)[**citl.news.niu**](https://citl.news.niu.edu/2022/08/30/openstax/)**​**
* **OpenStax Introductory Statistics – good match for STA 2023.**[**https://openstax.org/details/books/introductory-statistics**](https://openstax.org/details/books/introductory-statistics)[**citl.news.niu**](https://citl.news.niu.edu/2022/08/30/openstax/)**​**
* **MIT OCW single/multivariable calculus – full lecture series, notes, and exams.**[**https://ocw.mit.edu/courses/res-18-001-calculus-online-textbook**](https://ocw.mit.edu/courses/res-18-001-calculus-online-textbook)[**ocw-openmatters**](https://www.ocw-openmatters.org/ocw-bookshelf/)**​**[**https://ocw.mit.edu/courses/18-02sc-multivariable-calculus-fall-2010**](https://ocw.mit.edu/courses/18-02sc-multivariable-calculus-fall-2010)[**ocw-openmatters**](https://www.ocw-openmatters.org/ocw-bookshelf/)**​**
* **Diff Eq (MAP 2302): MIT OCW 18.03 Differential Equations.**[**https://ocw.mit.edu/courses/18-03sc-differential-equations-fall-2011**](https://ocw.mit.edu/courses/18-03sc-differential-equations-fall-2011)[**ocw-openmatters**](https://www.ocw-openmatters.org/ocw-bookshelf/)**​**
* **GitHub math teaching resources (PDEs etc., MATLAB): MathWorks Teaching Resources.**[**https://github.com/MathWorks-Teaching-Resourcesgithub**](https://github.com/MathWorks-Teaching-Resources)**​**

**Subreddit:**

* **r/learnmath – problem-solving and concept help.**[**https://www.reddit.com/r/learnmath**](https://www.reddit.com/r/learnmath)[**reddit**](https://www.reddit.com/r/byu/comments/pa151y/my_master_list_of_free_online_textbook_sites/)**​**

**Physics I–II (mechanics, E&M)**

* **OpenStax University Physics (Volumes 1–3).**[**https://openstax.org/details/books/university-physics-volume-1**](https://openstax.org/details/books/university-physics-volume-1)[**citl.news.niu**](https://citl.news.niu.edu/2022/08/30/openstax/)**​**[**https://openstax.org/details/books/university-physics-volume-2**](https://openstax.org/details/books/university-physics-volume-2)[**citl.news.niu**](https://citl.news.niu.edu/2022/08/30/openstax/)**​**
* **MIT OCW Physics I & II with full lectures, problems, exams.  
  Physics I:** [**https://ocw.mit.edu/courses/8-01sc-classical-mechanics-fall-2016**](https://ocw.mit.edu/courses/8-01sc-classical-mechanics-fall-2016)[**ocw-openmatters**](https://www.ocw-openmatters.org/ocw-bookshelf/)**​  
  Physics II:** [**https://ocw.mit.edu/courses/8-02sc-physics-ii-electricity-and-magnetism-fall-2012**](https://ocw.mit.edu/courses/8-02sc-physics-ii-electricity-and-magnetism-fall-2012)[**ocw-openmatters**](https://www.ocw-openmatters.org/ocw-bookshelf/)**​**

**YouTube channels (full physics playlists):**

* **Michel van Biezen – physics I/II playlists (kinematics, E&M, circuits).**[**https://www.youtube.com/@MichelvanBiezen**](https://www.youtube.com/@MichelvanBiezen)**youtube​**
* **Flipping Physics – conceptual + calculus-based physics.**[**https://www.youtube.com/@flippingphysics**](https://www.youtube.com/@flippingphysics)**youtube​**

**Subreddit:**

* **r/PhysicsStudents – course-specific questions and exam prep.**[**https://www.reddit.com/r/PhysicsStudents**](https://www.reddit.com/r/PhysicsStudents)[**reddit**](https://www.reddit.com/r/byu/comments/pa151y/my_master_list_of_free_online_textbook_sites/)**​**

**Chemistry sequence (Gen Chem, Org I, Biochem later)**

* **OpenStax Chemistry and Organic Chemistry – full textbooks.  
  Chem:** [**https://openstax.org/details/books/chemistry**](https://openstax.org/details/books/chemistry)[**citl.news.niu**](https://citl.news.niu.edu/2022/08/30/openstax/)**​  
  Organic:** [**https://openstax.org/details/books/organic-chemistry-2e**](https://openstax.org/details/books/organic-chemistry-2e)[**citl.news.niu**](https://citl.news.niu.edu/2022/08/30/openstax/)**​**
* **MIT OCW Principles of Chemical Science (Gen Chem).**[**https://ocw.mit.edu/courses/5-111sc-principles-of-chemical-science-fall-2014**](https://ocw.mit.edu/courses/5-111sc-principles-of-chemical-science-fall-2014)[**ocw-openmatters**](https://www.ocw-openmatters.org/ocw-bookshelf/)**​**

**YouTube:**

* **Leah4sci – mechanisms, org 1 & 2 problem walkthroughs.**[**https://www.youtube.com/@Leah4Sci**](https://www.youtube.com/@Leah4Sci)**youtube​**
* **The Organic Chemistry Tutor – gen chem, org, and math.**[**https://www.youtube.com/@TheOrganicChemistryTutor**](https://www.youtube.com/@TheOrganicChemistryTutor)**youtube​**

**Subreddit:**

* **r/chemhelp – homework and concept help.**[**https://www.reddit.com/r/chemhelp**](https://www.reddit.com/r/chemhelp)[**reddit**](https://www.reddit.com/r/byu/comments/pa151y/my_master_list_of_free_online_textbook_sites/)**​**

**Intro biology & human physiology**

* **OpenStax Biology – good for BSC 1010C foundations.**[**https://openstax.org/details/books/biology-2e**](https://openstax.org/details/books/biology-2e)[**citl.news.niu**](https://citl.news.niu.edu/2022/08/30/openstax/)**​**
* **OpenStax Anatomy & Physiology – supports BME 3403C/3404C.**[**https://openstax.org/details/books/anatomy-and-physiology**](https://openstax.org/details/books/anatomy-and-physiology)[**citl.news.niu**](https://citl.news.niu.edu/2022/08/30/openstax/)**​**
* **MIT OCW Biology portal – selection of intro and advanced bio courses.**[**https://ocw.mit.edu/courses/biology**](https://ocw.mit.edu/courses/biology)[**ocw.tau**](https://ocw.tau.edu.ng/courses/biology/)**​**

**YouTube:**

* **AK Lectures – biochem, cell bio, and physiology with derivations.**[**https://www.youtube.com/@AKLectures**](https://www.youtube.com/@AKLectures)**youtube​**
* **Ninja Nerd – physiology and pathophysiology, clinical framing.**[**https://www.youtube.com/@NinjaNerdOfficial**](https://www.youtube.com/@NinjaNerdOfficial)**youtube​**

**Subreddit:**

* **r/biology – broad; good for conceptual and resources.**[**https://www.reddit.com/r/biology**](https://www.reddit.com/r/biology)[**reddit**](https://www.reddit.com/r/byu/comments/pa151y/my_master_list_of_free_online_textbook_sites/)**​**

**Engineering foundations (statics, mechanics, mechatronics, MATLAB)**

**These cover EGM 3420C, EGN 3060C, EGN 1041C, etc.**[**catalog.fgcu**](https://catalog.fgcu.edu/courses/bme/)**​**

* **MIT OCW “Engineering Mechanics I/II” (statics/dynamics).**[**https://ocw.mit.edu/courses/1-050-engineering-mechanics-i-fall-2007**](https://ocw.mit.edu/courses/1-050-engineering-mechanics-i-fall-2007)[**ocw-openmatters**](https://www.ocw-openmatters.org/ocw-bookshelf/)**​**[**https://ocw.mit.edu/courses/1-051-engineering-mechanics-ii-spring-2008**](https://ocw.mit.edu/courses/1-051-engineering-mechanics-ii-spring-2008)[**ocw-openmatters**](https://www.ocw-openmatters.org/ocw-bookshelf/)**​**
* **Mechatronics: embedded systems roadmap + resources (GitHub).**[**https://github.com/m3y54m/Embedded-Engineering-Roadmapgithub**](https://github.com/m3y54m/Embedded-Engineering-Roadmap)**​**
* **MATLAB & Simulink teaching resources (live scripts, labs).**[**https://github.com/MathWorks-Teaching-Resourcesgithub**](https://github.com/MathWorks-Teaching-Resources)**​**

**YouTube:**

* **Learn Engineering – visual statics/dynamics/fluids explanations.**[**https://www.youtube.com/@LearnEngineering**](https://www.youtube.com/@LearnEngineering)**youtube​**
* **MATLAB channel – official tutorials, signal processing, control.**[**https://www.youtube.com/@MATLAB**](https://www.youtube.com/@MATLAB)[**github**](https://github.com/MathWorks-Teaching-Resources)**​**

**Subreddit:**

* **r/EngineeringStudents – exams, conceptual help, internships.**[**https://www.reddit.com/r/EngineeringStudents**](https://www.reddit.com/r/EngineeringStudents)[**reddit**](https://www.reddit.com/r/byu/comments/pa151y/my_master_list_of_free_online_textbook_sites/)**​**

**BME core: circuits, signals, instrumentation, biomechanics, transport**

**Your plan lists BME 3506C, 3507C, 4503C, 4211C, 3261C, 4632C, 4332C, 4722, 4800C, etc.**[**catalog.fgcu**](https://catalog.fgcu.edu/courses/bme/)**​**

**General bioengineering & OCW**

* **MIT Biological Engineering OCW (biotransport, biomaterials, etc.).**[**https://ocw.mit.edu/courses/biological-engineering**](https://ocw.mit.edu/courses/biological-engineering)[**opencw.aprende**](https://opencw.aprende.org/courses/biological-engineering/)**​**

**Subreddit:**

* **r/biomedicalengineering – devices, coursework, grad advice.**[**https://www.reddit.com/r/biomedicalengineering**](https://www.reddit.com/r/biomedicalengineering)[**reddit**](https://www.reddit.com/r/byu/comments/pa151y/my_master_list_of_free_online_textbook_sites/)**​**

**Circuits for Bioengineers (BME 3506C)**

**Conceptually same as “circuits + op-amps with biomedical flavor.”**[**bulletin.engin.umich+1**](https://bulletin.engin.umich.edu/courses/bme/)**​**

* **Text: “University Physics Vol. 2” circuits chapters (OpenStax).**[**https://openstax.org/details/books/university-physics-volume-2**](https://openstax.org/details/books/university-physics-volume-2)[**citl.news.niu**](https://citl.news.niu.edu/2022/08/30/openstax/)**​**
* **MIT OCW 6.002 Circuits and Electronics – gold standard core.**[**https://ocw.mit.edu/courses/6-002-circuits-and-electronics-spring-2007**](https://ocw.mit.edu/courses/6-002-circuits-and-electronics-spring-2007)[**ocw-openmatters**](https://www.ocw-openmatters.org/ocw-bookshelf/)**​**

**YouTube:**

* **All About Circuits – practical analog/digital.**[**https://www.youtube.com/@AllAboutCircuits**](https://www.youtube.com/@AllAboutCircuits)**youtube​**
* **Afrotechmods – intuitive electronics fundamentals.**[**https://www.youtube.com/@afrotechmods**](https://www.youtube.com/@afrotechmods)**youtube​**

**GitHub:**

* **Analog/digital electronics notes and labs (searchable collection):**[**https://github.com/topics/electronics-education**](https://github.com/topics/electronics-education)[**github**](https://github.com/chasedooley/mostly-free-resources-for-almost-everyone)**​**

**Signals & Systems for Bioengineers (BME 3507C)**

* **MIT OCW Signals and Systems (6.003).**[**https://ocw.mit.edu/courses/6-003-signals-and-systems-fall-2011**](https://ocw.mit.edu/courses/6-003-signals-and-systems-fall-2011)[**ocw-openmatters**](https://www.ocw-openmatters.org/ocw-bookshelf/)**​**
* **Biomedical signal processing intro lecture (YouTube).**[**https://www.youtube.com/watch?v=h44DykrDvjY**](https://www.youtube.com/watch?v=h44DykrDvjY)**youtube​**

**YouTube channels:**

* **Steve Brunton – control, signals, dynamical systems.**[**https://www.youtube.com/@eigensteve**](https://www.youtube.com/@eigensteve)**youtube​**
* **Brian Douglas – control systems (pairs well with feedback topics).**[**https://www.youtube.com/@BrianBDouglas**](https://www.youtube.com/@BrianBDouglas)**youtube​**

**GitHub:**

* **Biomedical signal processing examples (Python/MATLAB).**[**https://github.com/topics/biomedical-signal-processing**](https://github.com/topics/biomedical-signal-processing)[**github**](https://github.com/chasedooley/mostly-free-resources-for-almost-everyone)**​**

**Biomedical Instrumentation (BME 4503C)**

* **MIT OCW “Design of Medical Devices and Implants”.**[**https://ocw.mit.edu/courses/hst-552j-medical-device-design-spring-2010**](https://ocw.mit.edu/courses/hst-552j-medical-device-design-spring-2010)[**ocw-openmatters**](https://www.ocw-openmatters.org/ocw-bookshelf/)**​**
* **University BME instrumentation syllabi and notes (similar content).**[**https://bulletin.engin.umich.edu/courses/bme**](https://bulletin.engin.umich.edu/courses/bme)[**bulletin.engin.umich**](https://bulletin.engin.umich.edu/courses/bme/)**​**

**YouTube:**

* **“Biomedical Instrumentation” playlists (search term exact).  
  Example:** [**https://www.youtube.com/results?search\_query=biomedical+instrumentation+lecture**](https://www.youtube.com/results?search_query=biomedical+instrumentation+lecture)**youtube​**

**GitHub:**

* **Repos tagged “biomedical-instrumentation”.**[**https://github.com/topics/biomedical-instrumentation**](https://github.com/topics/biomedical-instrumentation)[**github**](https://github.com/chasedooley/mostly-free-resources-for-almost-everyone)**​**

**Biomechanics (BME 4211C) & Biofluids/Transport (BME 3261C, 4632C)**

**Content usually overlaps mechanical engineering + fluid mechanics.**[**catalog.fgcu**](https://catalog.fgcu.edu/courses/bme/)**​**

* **MIT OCW “Biomechanics of Movement”.**[**https://ocw.mit.edu/courses/2-131-advanced-biomechanics-of-structure-and-motion-spring-2004**](https://ocw.mit.edu/courses/2-131-advanced-biomechanics-of-structure-and-motion-spring-2004)[**ocw-openmatters**](https://www.ocw-openmatters.org/ocw-bookshelf/)**​**
* **MIT OCW “Introduction to Bioengineering (Fluid Mechanics)” modules.**[**https://ocw.mit.edu/courses/2-798j-introduction-to-biological-transport-processes-spring-2004**](https://ocw.mit.edu/courses/2-798j-introduction-to-biological-transport-processes-spring-2004)[**ocw-openmatters**](https://www.ocw-openmatters.org/ocw-bookshelf/)**​**
* **OpenStax Fluid Mechanics chapters in University Physics Vol. 1.**[**https://openstax.org/details/books/university-physics-volume-1**](https://openstax.org/details/books/university-physics-volume-1)[**citl.news.niu**](https://citl.news.niu.edu/2022/08/30/openstax/)**​**

**YouTube:**

* **Learning Engineering / Jeff Hanson for fluids & continuum.**[**https://www.youtube.com/results?search\_query=fluid+mechanics+lecture+series**](https://www.youtube.com/results?search_query=fluid+mechanics+lecture+series)**youtube​**

**GitHub:**

* **Applied transport/fluids notebooks (MATLAB/Python).**[**https://github.com/topics/transport-phenomena**](https://github.com/topics/transport-phenomena)[**github**](https://github.com/MathWorks-Teaching-Resources/Applied-PDEs)**​**

**Cellular & Tissue Engineering (BME 4332C)**

* **MIT OCW “Tissue Engineering”.**[**https://ocw.mit.edu/courses/hst-535-principles-and-practice-of-tissue-engineering-fall-2013**](https://ocw.mit.edu/courses/hst-535-principles-and-practice-of-tissue-engineering-fall-2013)[**ocw-openmatters**](https://www.ocw-openmatters.org/ocw-bookshelf/)**​**
* **MIT OCW “Biomaterials Science and Engineering”.**[**https://ocw.mit.edu/courses/3-055j-biomaterials-science-and-engineering-fall-2005**](https://ocw.mit.edu/courses/3-055j-biomaterials-science-and-engineering-fall-2005)[**ocw-openmatters**](https://www.ocw-openmatters.org/ocw-bookshelf/)**​**

**YouTube:**

* **“Tissue engineering lectures” search – university playlists.**[**https://www.youtube.com/results?search\_query=tissue+engineering+lectures**](https://www.youtube.com/results?search_query=tissue+engineering+lectures)**youtube​**

**GitHub:**

* **Tissue engineering / biomaterials repos.**[**https://github.com/topics/tissue-engineering**](https://github.com/topics/tissue-engineering)[**github**](https://github.com/chasedooley/mostly-free-resources-for-almost-everyone)**​**

**Design, product development, health-care engineering**

**For BME 4722 (Health Care Engineering) and BME 4800C (Product Design).[catalog.fgcu](https://catalog.fgcu.edu/courses/bme/)​**

* **MIT OCW “Design of Medical Devices and Implants” (relisted because it’s central).**[**https://ocw.mit.edu/courses/hst-552j-medical-device-design-spring-2010**](https://ocw.mit.edu/courses/hst-552j-medical-device-design-spring-2010)[**ocw-openmatters**](https://www.ocw-openmatters.org/ocw-bookshelf/)**​**
* **MIT OCW “Product Design and Development”.**[**https://ocw.mit.edu/courses/15-783j-product-design-and-development-spring-2006**](https://ocw.mit.edu/courses/15-783j-product-design-and-development-spring-2006)[**ocw-openmatters**](https://www.ocw-openmatters.org/ocw-bookshelf/)**​**

**Subreddits:**

* **r/medicaldevices – regulatory, design, and industry discussion.**[**https://www.reddit.com/r/medicaldevices**](https://www.reddit.com/r/medicaldevices)[**reddit**](https://www.reddit.com/r/byu/comments/pa151y/my_master_list_of_free_online_textbook_sites/)**​**

**General free-textbook and OCW indexes**

**Use these when you want an alternative text for a specific course.**

* **MIT OCW Bookshelf – index of free textbooks across departments.**[**https://www.ocw-openmatters.org/ocw-bookshelf**](https://www.ocw-openmatters.org/ocw-bookshelf)[**ocw-openmatters**](https://www.ocw-openmatters.org/ocw-bookshelf/)**​**
* **OpenStax main library – math, science, social science, econ, etc.**[**https://openstax.org/subjects**](https://openstax.org/subjects)[**citl.news.niu**](https://citl.news.niu.edu/2022/08/30/openstax/)**​**

**📘 Fall 2024**

**📐 MAC 2312 – Calculus II**

**Free Textbooks**

* **Calculus by Strang (MIT OCW):** [**https://ocw.mit.edu/courses/18-01-single-variable-calculus-fall-2006/**](https://ocw.mit.edu/courses/18-01-single-variable-calculus-fall-2006/)
* **OpenStax Calculus Vol 2:** [**https://openstax.org/details/books/calculus-volume-2**](https://openstax.org/details/books/calculus-volume-2)

**YouTube**

* **Professor Leonard Calc II:** [**https://www.youtube.com/playlist?list=PLDesaqWTN6ETzbP6v9lR7n9Va3k3c4\_iX**](https://www.youtube.com/playlist?list=PLDesaqWTN6ETzbP6v9lR7n9Va3k3c4_iX)
* **MIT 18.02 (covers series foundations):** [**https://www.youtube.com/playlist?list=PLUl4u3cNGP60hI9ATjSFgLZpbNJ7myAg6**](https://www.youtube.com/playlist?list=PLUl4u3cNGP60hI9ATjSFgLZpbNJ7myAg6)

**Problem Banks**

* **Paul's Online Math Notes (Series, Integrals):** [**https://tutorial.math.lamar.edu/**](https://tutorial.math.lamar.edu/)

**GitHub**

* **Calculus Jupyter Notebooks:** [**https://github.com/jayqi/calculus-notebooks**](https://github.com/jayqi/calculus-notebooks)

**Subreddits**

* **r/calculus**

**⚛ PHY 2048 / 2048L – Physics I**

**Free Textbooks**

* **OpenStax University Physics Vol 1:** [**https://openstax.org/details/books/university-physics-volume-1**](https://openstax.org/details/books/university-physics-volume-1)

**YouTube**

* **Michel van Biezen Physics I:** [**https://www.youtube.com/playlist?list=PLX2gX-ftPVXUHXNr7Pi3L3yqH6lX3mFVy**](https://www.youtube.com/playlist?list=PLX2gX-ftPVXUHXNr7Pi3L3yqH6lX3mFVy)
* **MIT Classical Mechanics 8.01:** [**https://www.youtube.com/playlist?list=PLUl4u3cNGP60A1oK3VY8vFm6zOYGbQEZi**](https://www.youtube.com/playlist?list=PLUl4u3cNGP60A1oK3VY8vFm6zOYGbQEZi)

**Practice**

* **HyperPhysics:** [**http://hyperphysics.phy-astr.gsu.edu/**](http://hyperphysics.phy-astr.gsu.edu/)
* **Physics LibreTexts:** [**https://phys.libretexts.org/**](https://phys.libretexts.org/)

**Subreddits**

* **r/PhysicsStudents**

**🤖 EGS 1006L – Intro to Engineering**

**Free Resources**

* **IEEE TryEngineering Projects:** [**https://tryengineering.org/students/**](https://tryengineering.org/students/)
* **MIT Engineering Design:** [**https://ocw.mit.edu/courses/2-00b-toy-product-design-spring-2017/**](https://ocw.mit.edu/courses/2-00b-toy-product-design-spring-2017/)

**YouTube**

* **“What is Engineering?” Series:** [**https://www.youtube.com/playlist?list=PLybg94GvOJ9GlYQJWEhxOBtNXH5DKeNsN**](https://www.youtube.com/playlist?list=PLybg94GvOJ9GlYQJWEhxOBtNXH5DKeNsN)

**🖥 EGN 1041C – Computational Tools for Engineers**

***(Usually MATLAB + Excel + Python basics)***

**MATLAB**

* **MATLAB Onramp (Free):** [**https://matlabacademy.mathworks.com/**](https://matlabacademy.mathworks.com/)
* **MIT 18.06SC Jupyter Labs:** [**https://ocw.mit.edu/courses/18-06sc-linear-algebra-fall-2011/pages/labs/**](https://ocw.mit.edu/courses/18-06sc-linear-algebra-fall-2011/pages/labs/)

**Python**

* **CS50P (Python):** [**https://www.youtube.com/playlist?list=PLhQjrBD2T3817j24-GogXmWqO5Q5vYy0V**](https://www.youtube.com/playlist?list=PLhQjrBD2T3817j24-GogXmWqO5Q5vYy0V)
* **“Python for Engineers” notebook set:** [**https://github.com/engineer-man/engineer-man-youtube**](https://github.com/engineer-man/engineer-man-youtube)

**🧬 BME 3403C – Human Physiology for Engineers I**

**Free Textbooks**

* **Human Physiology (OpenStax):** [**https://openstax.org/details/books/anatomy-and-physiology**](https://openstax.org/details/books/anatomy-and-physiology)
* **Neuroscience Online:** [**https://nba.uth.tmc.edu/neuroscience/**](https://nba.uth.tmc.edu/neuroscience/)

**YouTube**

* **MIT “Cellular Neurobiology”:** [**https://www.youtube.com/playlist?list=PLUl4u3cNGP63oMNUHXqIUcrkS2PivhN3k**](https://www.youtube.com/playlist?list=PLUl4u3cNGP63oMNUHXqIUcrkS2PivhN3k)
* **Khan Academy Physiology:** [**https://www.youtube.com/playlist?list=PLSQl0a2vh4HA92FQ0GsBYGVTtYJddTCeT**](https://www.youtube.com/playlist?list=PLSQl0a2vh4HA92FQ0GsBYGVTtYJddTCeT)

**Other**

* **Osmosis Physiology Basics:** [**https://www.youtube.com/c/Osmosis/videos**](https://www.youtube.com/c/Osmosis/videos)

**📘 Spring 2025**

**📐 MAP 2302 – Differential Equations**

**Free Textbooks**

* **Strang Differential Equations (PDF):** [**https://ocw.mit.edu/courses/18-03-differential-equations-spring-2010/pages/readings/**](https://ocw.mit.edu/courses/18-03-differential-equations-spring-2010/pages/readings/)
* **OpenStax Diff Eq:** [**https://openstax.org/details/books/differential-equations**](https://openstax.org/details/books/differential-equations)

**YouTube**

* **MIT 18.03 (THE gold standard):** [**https://www.youtube.com/playlist?list=PLEC88901EBADDD980**](https://www.youtube.com/playlist?list=PLEC88901EBADDD980)
* **Professor Leonard:** [**https://www.youtube.com/playlist?list=PLF6061160B55B0203**](https://www.youtube.com/playlist?list=PLF6061160B55B0203)

**Problem Banks**

* **Paul's Math Notes DE:** [**https://tutorial.math.lamar.edu/**](https://tutorial.math.lamar.edu/)

**⚛ PHY 2049 / 2049L – Physics II**

**Free Textbooks**

* **OpenStax University Physics Vol 2 (E&M):** [**https://openstax.org/details/books/university-physics-volume-2**](https://openstax.org/details/books/university-physics-volume-2)

**YouTube**

* **MIT 8.02 Electricity & Magnetism (legendary):** [**https://www.youtube.com/playlist?list=PLUl4u3cNGP63LOmB3\_O0xbgZVZibxj4rb**](https://www.youtube.com/playlist?list=PLUl4u3cNGP63LOmB3_O0xbgZVZibxj4rb)
* **Michel van Biezen E&M:** [**https://www.youtube.com/playlist?list=PLX2gX-ftPVXWXadnIQC3jcKju8wPNE7QE**](https://www.youtube.com/playlist?list=PLX2gX-ftPVXWXadnIQC3jcKju8wPNE7QE)

**🧱 EGM 3420C – Engineering Mechanics (Statics)**

**Free Textbooks**

* **Statics & Dynamics (OpenStax):** [**https://openstax.org/details/books/engineering-mechanics-statics**](https://openstax.org/details/books/engineering-mechanics-statics)

**YouTube**

* **LearnChemE Statics:** [**https://www.youtube.com/playlist?list=PL2CFFB2192BFD57E1**](https://www.youtube.com/playlist?list=PL2CFFB2192BFD57E1)
* **Jeff Hanson Statics:** [**https://www.youtube.com/playlist?list=PLdd6Zys8K1eRu5BmN2Egcin1VAnClFNIp**](https://www.youtube.com/playlist?list=PLdd6Zys8K1eRu5BmN2Egcin1VAnClFNIp)

**Problem Sites**

* **Mechanics Map:** [**https://mechanicsmap.psu.edu/**](https://mechanicsmap.psu.edu/)

**🖥 BME 3404C – Human Physiology for Engineers II**

**Resources are same tier as Physiology I (see above), plus:**

* **Neural Engineering (NPTEL):** [**https://www.youtube.com/playlist?list=PLYHaXvNA5JrevMbLhoazFQbDdw8pfCm-O**](https://www.youtube.com/playlist?list=PLYHaXvNA5JrevMbLhoazFQbDdw8pfCm-O)
* **Systems Biology (MIT):** [**https://www.youtube.com/playlist?list=PLy8CVak7-Br5zGIVL-gaZxnR9ojM3GxNA**](https://www.youtube.com/playlist?list=PLy8CVak7-Br5zGIVL-gaZxnR9ojM3GxNA)

**🛠 EGN 3433C – Design for Manufacturing**

**Free Textbooks**

* **Manufacturing Processes (MIT):** [**https://ocw.mit.edu/courses/2-810j-manufacturing-and-design-i-fall-2008/**](https://ocw.mit.edu/courses/2-810j-manufacturing-and-design-i-fall-2008/)
* **Fundamentals of Modern Manufacturing (notes PDF versions widely available but not strictly legal)**

**YouTube**

* **SME manufacturing processes series:** [**https://www.youtube.com/playlist?list=PLB572BA3ED0F700F1**](https://www.youtube.com/playlist?list=PLB572BA3ED0F700F1)

**📘 Fall 2025**

**🧪 BME 3100C – Intro to Biomaterials**

**Free Textbooks**

* **Biomaterials for Engineers (Free PDF):** [**https://biomaterials.org/resources**](https://biomaterials.org/resources)
* **Biomaterials (LibreTexts):** [**https://bio.libretexts.org/**](https://bio.libretexts.org/)

**YouTube**

* **Biomaterials course (UIUC):** [**https://www.youtube.com/playlist?list=PLCHBxApHO4-I8ahFS0dflGURuXnT7PNtV**](https://www.youtube.com/playlist?list=PLCHBxApHO4-I8ahFS0dflGURuXnT7PNtV)

**🤖 EGN 3060C – Intro to Mechatronic Design**

**Free Textbooks**

* **Arduino Engineering Kit Labs:** [**https://www.mathworks.com/arduino**](https://www.mathworks.com/arduino)

**YouTube**

* **Mechatronics Lectures:** [**https://www.youtube.com/playlist?list=PLMrJAkhIeNNQromC4WswpU1krLOq5Ro6S**](https://www.youtube.com/playlist?list=PLMrJAkhIeNNQromC4WswpU1krLOq5Ro6S)

**GitHub**

* **Mechatronics Example Projects:** [**https://github.com/topics/mechatronics**](https://github.com/topics/mechatronics)

**📘 MAC 2313 – Calculculus III**

**Textbooks**

* **OpenStax Multivariable Calculus:** [**https://openstax.org/details/books/calculus-volume-3**](https://openstax.org/details/books/calculus-volume-3)

**YouTube**

* **MIT 18.02 Multivariable Calc:** [**https://www.youtube.com/playlist?list=PLUl4u3cNGP60hI9ATjSFgLZpbNJ7myAg6**](https://www.youtube.com/playlist?list=PLUl4u3cNGP60hI9ATjSFgLZpbNJ7myAg6)
* **3Blue1Brown Vector Calculus:** [**https://www.youtube.com/playlist?list=PLHXZ9OQGMqxfUl0tcqPNTJsb7R6BqSLo6**](https://www.youtube.com/playlist?list=PLHXZ9OQGMqxfUl0tcqPNTJsb7R6BqSLo6)

**🩺 BME 3506C – Circuits for Bioengineers**

**Free Textbooks**

* **Circuit Theory (Allan R. Hambley) free notes:** [**https://www.electronics-tutorials.ws/**](https://www.electronics-tutorials.ws/)
* **OpenStax Introduction to Electrical Engineering:** [**https://openstax.org/details/books/college-physics**](https://openstax.org/details/books/college-physics)

**YouTube**

* **Neso Academy Circuits:** [**https://www.youtube.com/playlist?list=PLBlnK6fEyqRgLLlzdgiTUKULKJPYc0A4q**](https://www.youtube.com/playlist?list=PLBlnK6fEyqRgLLlzdgiTUKULKJPYc0A4q)
* **MIT Circuits:** [**https://www.youtube.com/playlist?list=PLZRTS0ZQ7Y0eHQgLgE4DQc6Gd\_Ie4E3dt**](https://www.youtube.com/playlist?list=PLZRTS0ZQ7Y0eHQgLgE4DQc6Gd_Ie4E3dt)

**📶 BME 3507C – Signals & Systems for Bioengineers**

**Free Textbooks**

* **Signals & Systems (Oppenheim) — free MIT notes:** [**https://ocw.mit.edu/courses/6-003-signals-and-systems-fall-2011/**](https://ocw.mit.edu/courses/6-003-signals-and-systems-fall-2011/)

**YouTube**

* **Neso Academy S&S:** [**https://www.youtube.com/playlist?list=PLBlnK6fEyqRhG6s3jYIU48CqsT5cyiDTO**](https://www.youtube.com/playlist?list=PLBlnK6fEyqRhG6s3jYIU48CqsT5cyiDTO)
* **Steve Brunton Signals Course:** [**https://www.youtube.com/playlist?list=PLMrJAkhIeNNQromC4WswpU1krLOq5Ro6S**](https://www.youtube.com/playlist?list=PLMrJAkhIeNNQromC4WswpU1krLOq5Ro6S)

**📘 Spring 2026**

**🧫 BME 4332C – Cellular & Tissue Engineering**

**Free Textbooks**

* **Tissue Engineering (NCBI Book):** [**https://www.ncbi.nlm.nih.gov/books/NBK234413/**](https://www.ncbi.nlm.nih.gov/books/NBK234413/)
* **Cell Biology LibreTexts:** [**https://bio.libretexts.org/**](https://bio.libretexts.org/)

**YouTube**

* **Tissue Engineering (Tufts):** [**https://www.youtube.com/playlist?list=PLAE4A9DB84AC5F823**](https://www.youtube.com/playlist?list=PLAE4A9DB84AC5F823)

**🥼 BME 4722 – Healthcare Engineering**

**Resources**

* **IHI Open School (Free healthcare engineering content):** [**https://www.ihi.org/education/IHIOpenSchool/**](https://www.ihi.org/education/IHIOpenSchool/)
* **Health Systems Engineering Basics (MIT):** [**https://ocw.mit.edu/courses/15-764-the-theory-of-operations-management-summer-2002/**](https://ocw.mit.edu/courses/15-764-the-theory-of-operations-management-summer-2002/)

**🧩 IDS 3920 – University Colloquium**

**This course is writing/project/reflection based.  
 Best resource: Purdue OWL writing guide** [**https://owl.purdue.edu/**](https://owl.purdue.edu/)

**📘 Fall 2026**

**🌊 BME 3261C – Biofluid Mechanics**

**Free Textbooks**

* **Fluid Mechanics (OpenStax):** [**https://openstax.org/details/books/college-physics**](https://openstax.org/details/books/college-physics)
* **Fluid Mechanics (MIT OCW):** [**https://ocw.mit.edu/courses/2-25-advanced-fluid-mechanics-fall-2013/**](https://ocw.mit.edu/courses/2-25-advanced-fluid-mechanics-fall-2013/)

**🦿 BME 4211C – Biomechanics**

**Free Textbooks**

* **Biomechanics Online:** [**https://bio.libretexts.org/Bookshelves/Biomechanics**](https://bio.libretexts.org/Bookshelves/Biomechanics)

**YouTube**

* **MIT Biomechanics Lectures:** [**https://www.youtube.com/playlist?list=PLybg94GvOJ9GlYQJWEhxOBtNXH5DKeNsN**](https://www.youtube.com/playlist?list=PLybg94GvOJ9GlYQJWEhxOBtNXH5DKeNsN)

**🧪 BME 4503C – Biomedical Instrumentation**

**Free Textbooks**

* **Biosensors Fundamentals (PDF):** [**https://www.ncbi.nlm.nih.gov/books/NBK554500/**](https://www.ncbi.nlm.nih.gov/books/NBK554500/)
* **ECG/EEG MIT resources:** [**https://ocw.mit.edu/index.htm**](https://ocw.mit.edu/index.htm)

**YouTube**

* **Biomedical Instrumentation course (IIT):** [**https://www.youtube.com/playlist?list=PLgwJf8NK-2e54DNmA5iHqPfK9y-7SPFGy**](https://www.youtube.com/playlist?list=PLgwJf8NK-2e54DNmA5iHqPfK9y-7SPFGy)

**📘 Spring 2027**

**💧 BME 4632C – Biotransport Phenomena**

**Resources**

* **Biotransport LibreTexts:** [**https://bio.libretexts.org/Learning\_Objects/Bookshelves/Biomechanics/Biotransport**](https://bio.libretexts.org/Learning_Objects/Bookshelves/Biomechanics/Biotransport)
* **Transport MIT OCW:** [**https://ocw.mit.edu/courses/10-50-analysis-of-transport-phenomena-fall-2004/**](https://ocw.mit.edu/courses/10-50-analysis-of-transport-phenomena-fall-2004/)

**🩻 BME 4503C – Medical Imaging**

**Free Textbooks**

* **Medical Imaging — NCBI:** [**https://www.ncbi.nlm.nih.gov/books/NBK259/**](https://www.ncbi.nlm.nih.gov/books/NBK259/)
* **Introduction to Biomedical Imaging — MIT:** [**https://ocw.mit.edu/courses/hst-582j-biomedical-signal-and-image-processing-spring-2007/**](https://ocw.mit.edu/courses/hst-582j-biomedical-signal-and-image-processing-spring-2007/)

**🛠 BME 4884/4885 – Senior Design I & II**

**Resources**

* **MIT Engineering Design:** [**https://ocw.mit.edu/courses/2-007-design-and-manufacturing-i-spring-2009/**](https://ocw.mit.edu/courses/2-007-design-and-manufacturing-i-spring-2009/)
* **Hardware project GitHub repos:** [**https://github.com/awesome-engineering**](https://github.com/awesome-engineering)
* **FDA Device Design Pathway:** [**https://www.fda.gov/medical-devices**](https://www.fda.gov/medical-devices)

**Should I integrate my MindMap pwa into my workspace for the mental health reminders, ai chat bot, in app reminders to take a break from studying every 30 minutes, and after i’ve been on the workspace for me 90 minutes, and a very basic daily logging of how i feel from 1-10 to keep track of how I feel while studying? Maybe it can all be added onto the dashboard and the progress I log on this version of mindmap can contribute data and progress to my mindmap charts on other devices?**