How to Learn Bioinformatics

2018/10/13

学习（Learn）

- 学（知识）
- 习（实践）

新时代大学生应该如何学习

- 树立**终身学习**的理念，不然很快被淘汰
- 培养**主动学习**的能力，大学四年后同学之间最大的差别
- 培养**创造创新**的能力，立足社会、创造价值的根本

学什么

- 生物
- 计算机
- 数理

1. Concepts
2. 思维方式
3. 理解问题
4. 结果交流

做什么（习）

- **做实验**，理解生物学问题（生物）
- **开发算法**，熟悉相关数理算法（计算机）
- 将生物学问题与已有的算法建立联系或转换（生信）
- 高效实现（coding）

How to be a bioinformatician

1. Learn Linux
2. Embrace the “Unix tools philosophy”
3. Don’t reinvent the wheel
4. If you happen to invent a wheel, …
5. Value your time
6. **Make use of free online resources to learn**
7. Become an expert
8. Decide early on academia or industry
9. Keep learning and be updated
10. Embrace the challenge

OSSU

Open Source Society University

KEEP LEARNING.

computer-science

🎓 Path to a free self-taught education in Computer Science!

computer-science courses awesome-list

★ 34,941 4,962 MIT Updated 2 days ago

---

data-science

📊 Path to a free self-taught education in Data Science!

★ 5,315 904 Updated on Sep 5

---

bioinformatics

🔬 Path to a free self-taught education in Bioinformatics!

★ 639 146 Updated on Aug 24

1st Year

Code	Course	Duration	Effort
BIO 1311	Introduction to Biology	12 weeks	7-14 Hours/Week
CHEM 1311	Principles of Chemistry	15 Weeks	4-6 Hours/Week
COMP 1311a	CS 1 - Python 1	5 Weeks	6 Hours/Week
COMP 1311b	CS 1 - Python 2	4 Weeks	6 Hours/Week
COMP 1311c	CS 1 - Principles of Computing 1	4 Weeks	6 Hours/Week
COMP 1311d	CS 1 - Principles of Computing 2	4 Weeks	6 Hours/Week
MATH 1311	College Algebra and Problem Solving	4 Weeks	6 Hours/Week
MATH 1312	Pre-calculus	4 Weeks	6 Hours/Week
MATH 1313	Calculus 1 - Functions	3 Weeks	8 Hours/Week
MATH 1314	Calculus 2 - Differentiation	3 Weeks	8 Hours/Week
MATH 1315	Introduction to Probability and Data (with R)	5 Weeks	6 Hours/Week

2nd Year

Code	Course	Duration	Effort
BIO 2311	Biochemistry	15 Weeks	4-6 Hours/Week
CHEM 2311	Organic Chemistry	15 Weeks	4-6 Hours/Week
COMP 2311	CS 2 - Object Oriented Java	6 Weeks	4-6 Hours/Week
MATH 2311	Calculus 3 - Integration	4 Weeks	8 Hours/Week
MATH 2312	Mathematics for CS	13 Weeks	6 Hours/Week
COMP 2312	Introduction to Databases	10 Weeks	8-12 Hours/Week
MATH 2313	Linear Algebra	15 Weeks	8 Hours/Week
COMP 2313	Introduction to Linux	8 Weeks	5-7 Hours/Week
MATH 2314	Inferential Statistics (with R)	5 Weeks	6 Hours/Week

3rd Year

Code	Course	Duration	Effort
BIO 3311	Proteins' Biology	5 Weeks	4-6 Hours/Week
COMP 3311a	Algorithmic Thinking 1	4 Weeks	6 Hours/Week
COMP 3311b	Algorithmic Thinking 2	4 Weeks	6 Hours/Week
MATH 3311	Linear Regression and Modeling (with R)	4 Weeks	6 Hours/Week
MATH 3312	Bayesian Statistics (with R)	5 Weeks	6 Hours/Week
BIO 3312	Cell Biology	- Weeks	- Hours/Week
MATH 3313	Differential Equations	7 Weeks	8-10 Hours/Week
BIO 3313a	Biostatistics 1	4 Weeks	3-5 Hours/Week
BIO 3313b	Biostatistics 2	4 Weeks	3-5 Hours/Week

4th Year

Code	Course	Duration	Effort
BIO 4311	DNA: Biology's Genetic Code	6 Weeks	4-6 Hours/Week
COMP 4311	Data Science	13 Week	10 Hours/Week
BIO 4312a	Molecular Biology	16 Weeks	4-8 Hours/Week
BIO 4312d	Bioinformatics 1	4 Weeks	4-10 Hours/Week
COMP 4312a	Bioinformatics 2	4 Week	6 Hours/Week
COMP 4312b	Bioinformatics 3	4 Week	6 Hours/Week
COMP 4312c	Bioinformatics 4	4 Week	6 Hours/Week
COMP 4312d	Bioinformatics 5	4 Week	6 Hours/Week
COMP 4312e	Bioinformatics 6	4 Week	6 Hours/Week
COMP 4312f	Bioinformatics 7 (Capstone)	3 Week	3-4 Hours/Week
BIO 4313	Evolution	11 Weeks	4-6 Hours/Week

Extra Year

Code	Course	Duration	Effort
COMP 5311	Introduction to Machine Learning	10 Weeks	6 Hours/Week
COMP 5312	Deep Learning	8 Weeks	6 Hours/Week
Extension	Genomic Data Science Specialization	32 Week	6 Hours/Week

> Will continue with Master's in Bioinformatics

This list will be updated regularly
Keep in be informed

几点说明

- Courses from the **best universities** in the World
- **Free** （指的是不要证书的情况下是免费的）
- Complete the courses **in order**

如何操作

- Create an account in **Trello**
- Copy this board to your personal account
- Track and show your progress
- Take all the courses
- Keep learning every day and let your friends know

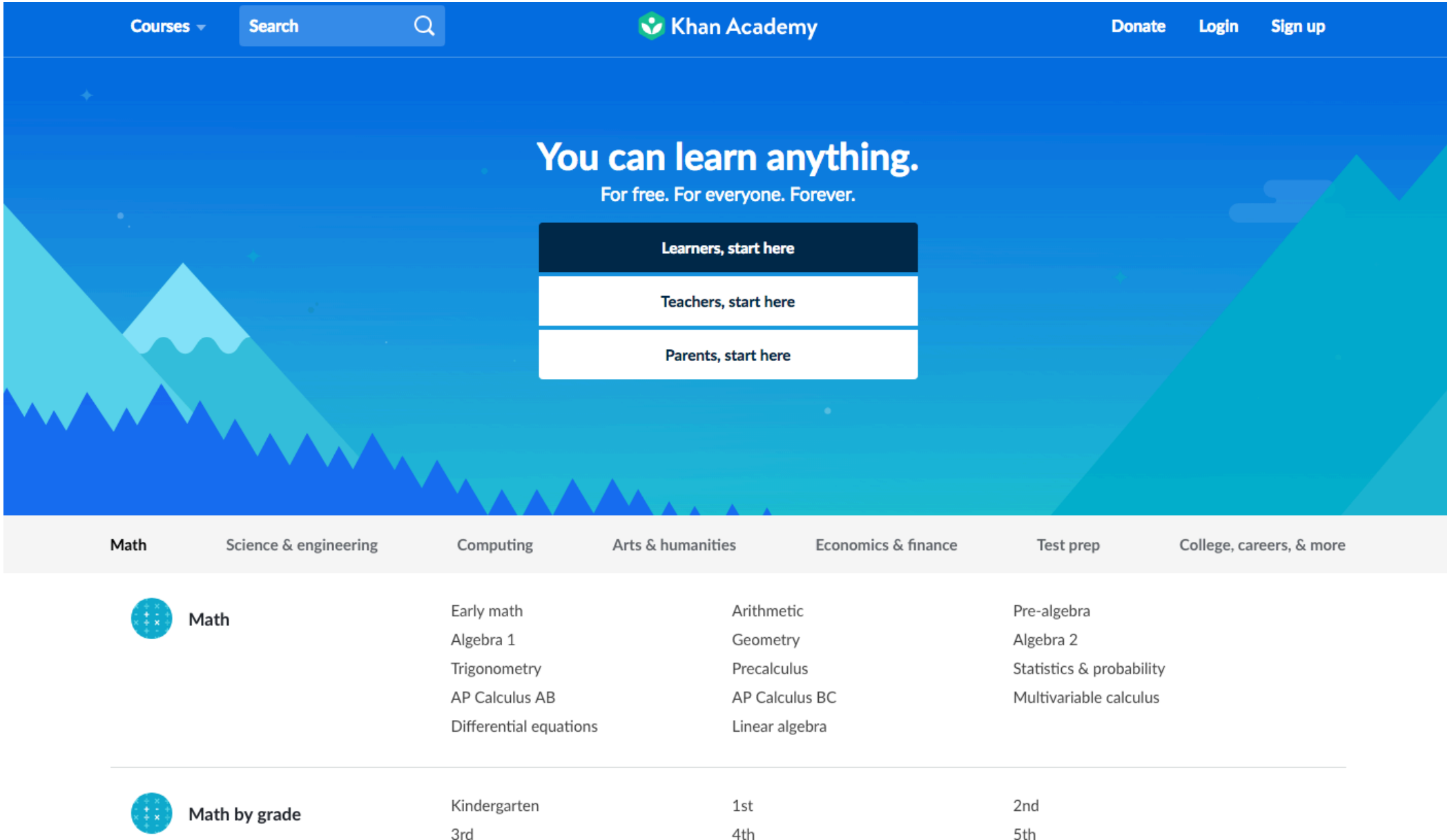
演示

- 注册Trello
- 拷课程清单，清单地址：https://trello.com/b/yax8Kgnh
- 在电脑或手机上打开Trello

问题

- 有些视频材料放在Youtube上，需翻墙才能看到
- 计算资源有限
- 课程太难了，想从更初级的开始学

学前、小学、初中、高中课程


Courses
Search
Khan Academy
Donate
Login
Sign up
You can learn anything.
For free. For everyone. Forever.
Learners, start here
Teachers, start here
Parents, start here
Math
Science & engineering
Computing
Arts & humanities
Economics & finance
Test prep
College, careers, & more
Math
Early math
Arithmetic
Pre-algebra
Algebra 1
Geometry
Algebra 2
Trigonometry
Precalculus
Statistics & probability
AP Calculus AB
AP Calculus BC
Multivariable calculus
Differential equations
Linear algebra
Math by grade
Kindergarten
1st
2nd
3rd
4th
5th

Math	Early math	Arithmetic	Pre-algebra
	Algebra 1	Geometry	Algebra 2
	Trigonometry	Precalculus	Statistics & probability
	AP Calculus AB	AP Calculus BC	Multivariable calculus
	Differential equations	Linear algebra	
Math by grade	Kindergarten	1st	2nd
	3rd	4th	5th
	6th	7th	8th
	Illustrative Mathematics	Eureka Math/EngageNY	High school
Science & engineering	Physics	AP Physics 1	AP Physics 2
	Cosmology & astronomy	Chemistry	AP Chemistry
	Organic chemistry	Biology	High school biology
	AP Biology	Health & medicine	Electrical engineering
Computing	Computer programming	Computer science	Hour of Code
	Computer animation		
Arts & humanities	World history	US history	AP US History
	Art history	Grammar	

Economics & finance	Microeconomics	Macroeconomics	Finance & capital markets
Test prep	SAT GMAT	LSAT IIT JEE	MCAT NCLEX-RN
College, careers, & more	College admissions Entrepreneurship	Careers Growth mindset	Personal finance