Blended Learning

麻省理工学院官方课程项目

前言

—

Blended Learning
核心能力群

学术能力
Academic Background

科研能力
Research Capability

实践应用能力
Practical Skills

社会责任
Social Responsibilities

SPOC

小规模在线课程

Small Private Online Course

+

PBL

项目制学习

Project-based Learning

+

Bootcamp

波士顿线下训练营

+

GTC

全球人才计划

Global Talent Community

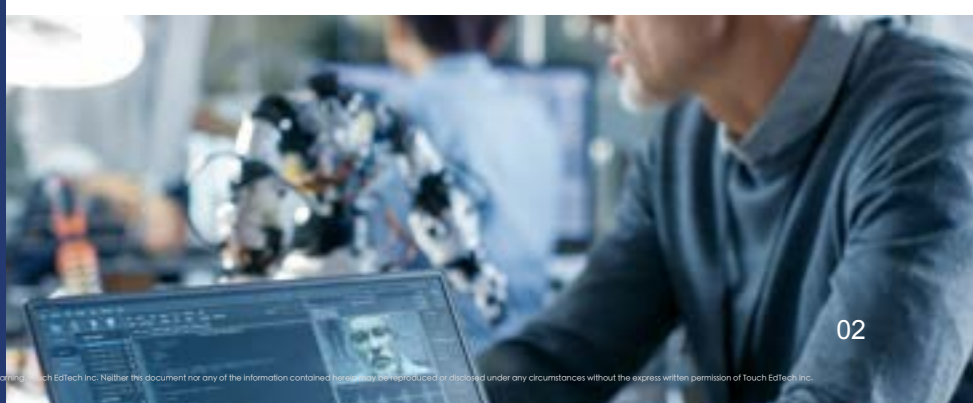
Blended Learning
麻省理工学院官方课程项目

Blended Learning(混合式学习)麻省理工学院官方课程项目集合了麻省理工学院（MIT）众多顶尖教研资源，旨在为全世界的大学生提供一次近距离接触 MIT在科技领域最前沿科研学术成果的机会。

Blended Learning MIT official Online Program integrates many top teaching and research resources of the Massachusetts Institute of Technology (MIT), aiming to provide college students all over the world with a close encounter Opportunities for MIT's cutting-edge scientific research and academic achievements in the field of technology.

课程项目将通过SPOC（小规模在线课程）、PBL（项目制学习）、Bootcamp（线下训练营）、GTC（全球人才计划）四大模块全面提升学生在学术、科研、实践方面的核心竞争力，同时培养其作为国际人才的社会责任感。对人才的培养将会落实到每一天的教学中。

The Program will comprehensively enhance the core competitiveness of students in academic, scientific research, and practice through the three modules of SPOC (Small Online Course), PBL (Project-based Learning), and GTC (Global Talent Program), while cultivating them as an the social responsibility of international talents. The training of talents will be implemented every day of teaching.



Blended Learning
授课学院

麻省理工学院
Massachusetts Institute of Technology

麻省理工学院在2021年QS世界大学排名中位列全球第一。
MIT ranks first in the world in the 2021 QS World University Rankings.

截至2020年10月，麻省理工学院的校友、教授及研究人员中共有97位诺贝尔奖得主、8名菲尔兹奖获奖者、26位图灵奖得主，以及52位国家科学奖章获奖者、45位罗德学者、38名麦克阿瑟奖得主。

As of October 2020, MIT alumni, professors and researchers have won 97 Nobel Prize winners, 8 Fields Medal winners, 26 Turing Award winners, and 52 National Science Medal winners , 45 Rhodes Scholars, 38 MacArthur Award winners.

截至2014年，由MIT校友所创办的公司利润总值相当于全球第十一大经济体。

MIT also has a strong entrepreneurial culture. The total profit of the company founded by its alumni is equivalent to the world's eleventh largest economy (as of 2014).

苏世民计算机学院
MIT Stephen A. Schwarzman College of Computing

苏世民计算学院成立于2018年，是麻省理工学院计算机、人工智能、大数据以及各个应用领域的跨学科研究中心。

Schwarzman School of Computing was established in 2018 and is an interdisciplinary research center for MIT's computer, artificial intelligence, big data, and various application fields.

通过计算和AI 的发展，苏世民计算学院致力于推动各交叉学科群的发展。 同时，各学科领域的需求和进步也不断重塑计算和AI领域的未来。 苏世民计算学院的使命即解决无所不在的计算问题，以及应对风起云涌的AI 所带来的全新机遇和挑战。

Schwarzman School of Computing promotes the development of other disciplines through computing and artificial intelligence, and on the other hand, it also reshapes the future of computing and artificial intelligence through the needs and insights of other fields. Schwarzman Computing Institute is committed to responding to the new opportunities and challenges brought by ubiquitous computing and the surging artificial intelligence.

MIT Open Learning
Blended Learning 官方部门

作为MIT负责全球教学事务的校级部门，MIT Open Learning 通过以下方式实现自我使命：1. 支持麻省理工学院的教职员工和学生进行大胆的实验；2. 促进和实现定量，严格，跨学科的教学研究；3. 为数字化教育提供平台；4. 与学校，大学，公司，非政府组织和政府达成合作，分享研究成果和最佳实践案例；5. 将麻省理工学院的知识扩展到全世界

MIT Open Learning fulfill its mission by: Supporting MIT faculty and students in bold experiments to enhance our residential education; Promoting and enabling quantitative, rigorous, inter-disciplinary; research on teaching and learning; Providing platforms for digital education; Sharing research and best practice by convening and partnering with schools.; universities, companies, NGOs and governments; Extending MIT's knowledge to the world

什么是 Small Private Online Course - SPOC?

("AI+X" Blended Learning - SPOC在线学习平台录播课程截图)

SPOC小规模在线教学
Small Private Online Course

- 学习平台：麻省理工学院官方线上学习平台
  Learning platform: MIT's official online learning platform
- 模块时长：6周
  Module duration: 6 weeks
- 模块构成：顶尖教授亲授直播课、MIT官方学习平台录播课程、平台课后测验
  Module composition: live lectures taught by top professors, recorded and broadcasted courses on MIT's official learning platform, after-class tests on the platform
- 必修定义：学生须至少完成以下基础SPOC 或高阶SPOC中的一门课程以进行后续PBL 、Bootcamp的学习，及参与GTC 相关活动。
  Prerequisite definition: Students must complete at least one of the following base SPOC or advanced SPOC courses in order to participate in PBL, Bootcamp, and GTC related activities.

基础SPOC：机器学习，建模和仿真原理
Machine Learning, Modeling, and Simulation Principles

模块课程时间花费：6周，6-10小时/每周。（具体时长视课程安排）
Module course time spent: 6 weeks, 6-10 hours/week. (Depending on the actual schedule)

课程内容：

该SPOC的重点是向学生介绍机器学习的基本技术，例如建模基础，优化和概率方法。通过学习平台上课程、模拟练习以及互动式教授直播课程，学生将在机器学习和人工智能打下坚实的基础，这些基础可用于此融合学习计划和现实世界中的更高级课程。

The focus of the SPOC is to introduce students to the basic techniques of machine learning, such as the basics of modeling, optimization and probability methods. Through taking pre–recorded lectures on the learning platform, simulation exercises and live sessions, students will build a solid foundation in machine learning and artificial intelligence. The knowledge can also be used in this blended learning plan and more advanced courses in the real world.

6周时间，学生将完成以下知识点的学习：
The 6-week SPOC will cover all topics below:

- 机器学习概念，线性代数和矩阵运算的介绍
  Introduction. Review of Linear Algebra and Matrix Operations
- 建模基础及更多建模与仿真优化
  Modeling Fundamentals and More Modeling and Simulation
- 数据驱动建模
  Optimization and Data-Driven Modeling
- 从优化到机器学习概率方法
  From Optimization to Machine Learning Probabilistic Methods
- 具体案例研究与总结
  Case Studies and Summary

高阶SPOC：将机器学习应用于工程和科学
Applying Machine Learning to Engineering and Science

模块课程时间花费：6周，6-10小时/每周。（具体时长视课程安排）
Module course time spent: 6 weeks, 6-10 hours/week. (Depending on the actual schedule)

课程内容：

该SPOC会将在基础SPOC中获得的机器学习知识应用于各种主题，这些主题展示了人工智能在现实世界中的广泛应用。学生将与世界知名教授一起探索诸如计算成像、几何表示、计算材料探索和复合设计等主题，这将使学生对机器学习技术正在革新的许多领域有更深入的了解。

This SPOC will apply the machine learning knowledge obtained in the Base SPOC to various topics, which demonstrate the wide application of artificial intelligence in the real world. Students will work with world-renowned professors to explore topics such as computational imaging, geometric representation, computational material discovery, and composite design. This will enable students to have a deeper understanding of many areas where machine learning technology is being revolutionized.

6周时间，学生将完成以下知识点的学习：
The 6-week SPOC will cover all topics below:

- 锂离子电池寿命预测中的特征工程
  Feature Engineering in Li-Ion Battery Life Prediction
- 计算成像的机器学习
  Machine Learning for Computational Imaging
- 地震深度伪造：神经网络生成丢失的数据
  Seismic Deep Fakes: Neural Nets to Generate Missing Data
- 油气产量预测
  Prediction of Oil and Gas Production
- 几何表示中的机器学习
  Machine Learning in Geometric Representations
- 使用机器学习量化复杂系统中的风险
  Quantifying Risk in Complex Systems Using Machine Learning
- 机器学习加速计算材料发现
  Machine Learning in Accelerating Computational Materials Discovery
- 复合设计中的实用机器学习
  Practical Machine Learning in Composite Design
- 航空航天中的机器学习
  Machine Learning in Aerospace

什么是 Small Private Online Course - SPOC?

基础SPOC：量子计算入门

Introduction to Quantum Computing

模块课程时间花费：4周，6-10小时/每周。（具体时长视课程安排）

Module course time spent: 4weeks, 6-10 hours/week. (Depending on the actual schedule)

课程内容：

该SPOC的重点是向学生介绍量子计算的基本技术，包括量子计算与经典计算之间的实质差异以及量子计算机能够正常运行的关键技术要求。通过学习平台上课程、模拟练习以及互动式教授直播课程，学生将能够评估量子计算的潜在业务应用并了解量子计算机开发人员当前面临的工程挑战，这些基础可用于此融合学习计划和现实世界中的更高级课程。

The focus of the SPOC is to introduce students to the basic techniques of quantum computing, such as substantial differences between quantum and classical computing and key technology requirements for quantum computers to be able to function properly. Through taking pre-recorded lectures on the learning platform, simulation exercises and live sessions, students will be able to assess potential business applications for quantum computing and understand engineering challenges currently faced by developers of real quantum computers. The knowledge can also be used in this blended learning plan and more advanced courses in the real world.

4周时间，学生将完成以下知识点的学习

The 4-week SPOC will cover all topics below:

- 计算种类和量子计算导论
  lypes of Computing and Introduction to Quantum Computing
- 量子比特模式及其评估原则，量子比特鲁棒性
  Leading Qubit Modalities and Qubit Robustness
- 量子算法，量子通信和计算复杂性
  Quantum Algorithms, Quantum Communication and Computational Complexity
- Deutsch-Jozsa 算法在IBM量子计算机上的简单实践
  The Deutsch-Jozsa Quantum Algorithm in Practice

高阶SPOC： 用于网络安全，化学和优化的量子算法

Quantum Algorithms for Cybersecurity, Chemistry, and Optimization

模块课程时间花费：6周，6-10小时/每周。（具体时长视课程安排）

Module course time spent: 4 weeks, 6-10 hours/week. (Depending on the actual schedule)

课程内容：

该SPOC会将在基础SPOC中获得的量子计算知识应用于各种主题，这些主题展示了量子算法如何在网络安全，化学和优化领域实现潜在的性能提升。学生将与世界知名教授一起总结量子计算机能够运行实际的大型量子算法的技术要求，探索量子算法以及其优化方法。学生能够对量子计算技术的许多领域有更深入的了解。

The focus of the SPOC is to apply the knowledge in quantum computing acquired from the Base SPOC into various topics, which demonstrate the potential performance gains enabled by quantum algorithms, over classical algorithms, for cybersecurity, chemistry, and optimization. Students will work with world-renowned professors to summarize the technology requirements for quantum computers to be able to run realistically large quantum algorithms and gain proficiency with the engineering requirements for implementing quantum algorithms. This will enable students to have a deeper understanding of many areas where quantum computing is being revolutionized.

4周时间，学生将完成以下知识点的学习：

The 4-week SPOC will cover all topics below:

- 现代密码学和肖氏算法
  Modern Cryptography and Shor' s Algorithm
- 量子密码学：单光子模式，光子纠缠模式，随机数生成和量子中继器
  Quantum Cryptography: Single Photon, Entangled Photon, Random Number and Quantum Repeaters
- 量子哈密顿模拟问题和化学领域的量子算法
  The Quantum Hamiltonian Simulation Problem and Quantum Simulation in Chemistry
- 绝热量子计算机 (AQC)，量子退火与量子优化
  Adiabatic Quantum Computing, Quantum Annealing and Polynomial-Speedup Quantum Algorithms

什么是
PBL 项目制学习 Project-Based Learning

PBL的全称为Project-Based Learning，即项目制学习。
PBL is short for Project-Based Learning.

由项目导师带领指导，学生选择其感兴趣的PBL科研项目进行12周的线上学习。每个项目将被分为不同的细分方向（Tracks），学生择一进行深入研究，并在项目时间内完成一篇可发表的高质量科研论文。

PBL is short for Project-Based Learning. Guided by a project lead, students can choose PBL projects they are interested in for 12 weeks of online learning. Each project will be divided into different Tracks, where students can choose one to conduct in-depth research and produce a high-quality paper that can be published within the project's time frame.

PBL模块可选13大项目方向：
13 project directions available for PBL module

A 机器学习在医疗中的应用 - Johnson & Johnson 项目
Machine Learning in Healthcare - Johnson & Johnson Project

B 互联网行为干预 - Yelp 项目
Engineering Online Behavior - Yelp Project

C 智能推荐系统 - Netflix 项目
Recommendation Systems - Netflix Project

D 适用于下一代AI应用程序的新型硬件 - Tesla 项目
Designing Machine Learning Hardware - Tesla Project

E 自然语言处理 - Apple Siri 项目
Natural Language Processing - Apple Siri Project

F 卷积神经网络在计算机视觉&自然语言处理中的应用 - Google 项目
Convolutional Neural Networks for Computer Vision & Natural Language Processing - Google Project

G 计算机视觉与图像处理 - Microsoft 项目
Computer Vision and Image Processing - Microsoft Project

H 原子模拟 - Schrödinger 项目
Atomistic Simulation - Schrödinger Project

I 机器学习在量化金融中的应用 - J.P. Morgan 项目
Machine Learning in Quantitative Finance - J.P. Morgan

J 机器学习与智能交通 - Lyft项目
Machine Learning and Smart Transportation - Lyft Project

K 深度学习在医疗图像中的应用 - Siemens 项目
Deep Learning in Medical Imaging - Siemens Project

L 数据驱动教育 - Canvas 项目
Advancing Education with Human Data - Canvas Project

M 算法交易 - Charles Schwab 项目
Algorithmic Trading - Charles Schwab Project

扫描二维码添加课程顾问老师并索要具体PBL课程大纲

Scan the QR code to add a Program Advisor and ask for a specific PBL course description

请注意添加时务必中文备注姓名，学校，学院及学号

Please notice that the name, school, college and student number must be noted in Chinese when adding a Program Advisor.

Bootcamp
波士顿线下训练营
Boston Bootcamp

训练营内容：
Bootcamp content

MIT学术研讨
MIT Faculty Seminars

科研创新项目实践
Innovation Workshops

顶级专家行业研讨
Seminars with industry experts

MIT企业联合实验室工作坊
Enterprise Workshops

校园文化交流活动
Cultural Experience

训练营形式：
Bootcamp format

Bootcamp以交流学习体验为主，学生需前往美国波士顿进行为期2-3周的线下访问学习。作为MIT官方课程项目中的一部分，学生将与MIT顶尖教授、专家面对面进行各类学术、行业的研讨。

Bootcamp focuses on communication and learning experience, students need to go to Boston, USA for a 2-3 week onsite study. As part of the official MIT curriculum project, students will meet face-to-face with top MIT professors and experts to conduct various academic and industry seminars.

同时，学生也将有机会走进波士顿本地如哈佛大学等世界名校校园以及顶尖科技企业进行访问学习，这将对学生提前了解美国高校特别是MIT的学习及科研环境、感受学术氛围有极大的帮助。

At the same time, students will also have the opportunity to visit the campuses of world-renowned universities such as Harvard University and top technology companies in Boston for onsite study. This will greatly help students understand the learning and scientific research environment of American universities, especially MIT, and feel the academic atmosphere in advance.

项目最后，学生需与小组同学共同完成一个创新实践项目，并撰写相应报告完成展示。完成项目同学将获得相应证书。

At the end of the Bootcamp, students need to complete an innovative practice project with their group students, and write a corresponding report to complete the presentation. Students who complete the Bootcamp will get the corresponding certificate.

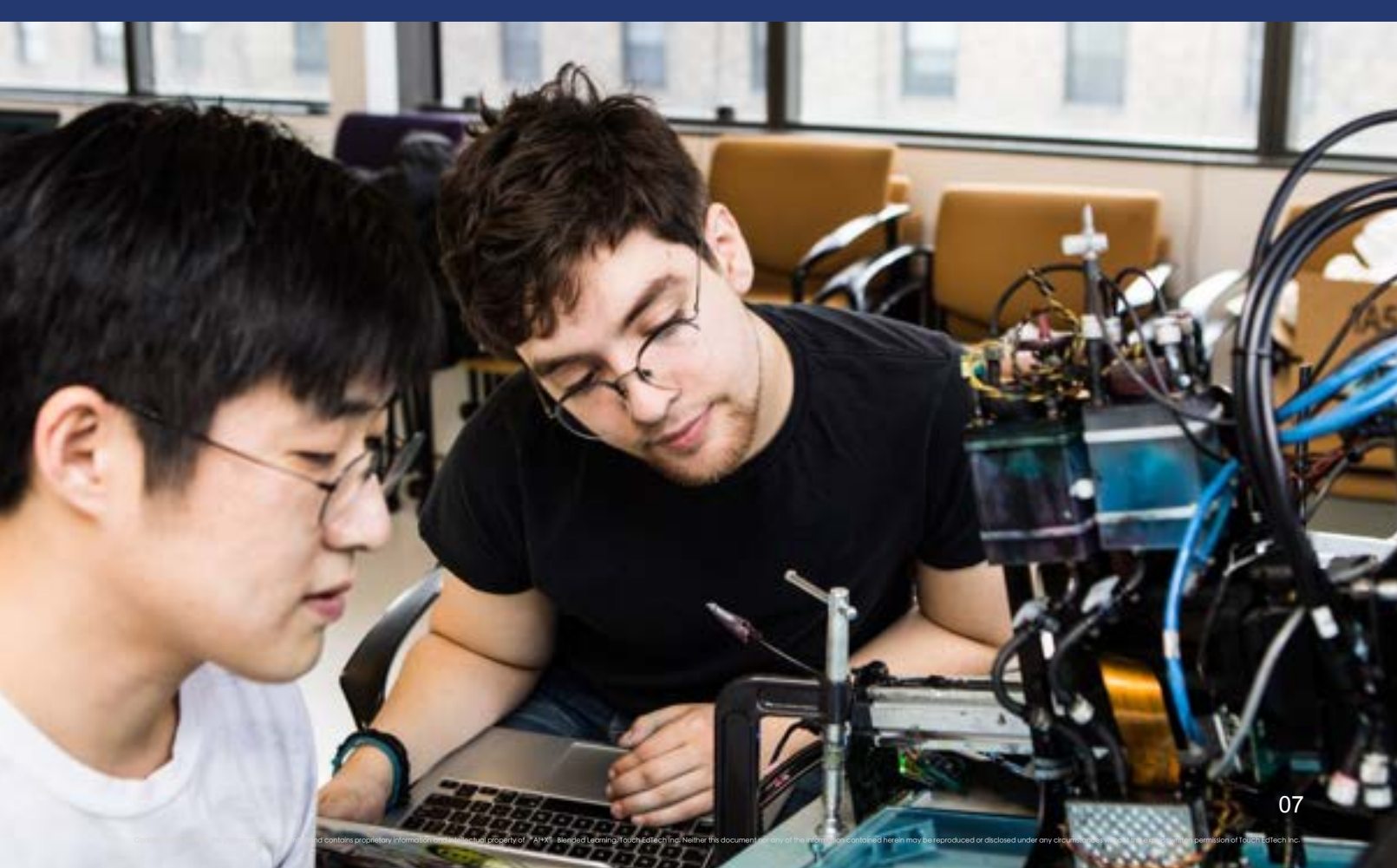
项目时间：
Project Time

预计2022年开始
Expected to start in 2022

Bootcamp 先导条件：
Bootcamp Prerequisites

学生须至少完成基础SPOC 或高阶SPOC中的一门课程以进行Bootcamp的学习。

Students must complete at least one of the base SPOC or advanced SPOC courses in order to participate in the Bootcamp.



Blended Learning
课程成果
Blended Learning Outcomes

完成SPOC：
Complete SPOC

1. 麻省理工学院官方证书
MIT Official Certificate

完成 SPOC 课程项目学生可获麻省理工学院官方证书，每一份证书均含有单独链接可链接至MIT官网档案查询。

Students who complete the SPOC program will obtain an official MIT certificate. Each certificate contains separate ink hat an e inked o he IT fficial ebsite ile or uery.

2. 美国高校实践类学分认可
Credits Recognizations

SPOC课程会授予2学分的“实践类学分”，全美通用。中国部分高校可认证并转换为本校相应学分。

SPOC courses will grant 2 credits of "practical credits", which are universal in the United States. Some universities in China can be accredited and converted into corresponding credits.

3. SPOC学习轨迹分析报告 & 综合表现评价
Learning Analytics Report & Performance Summary

取代传统成绩单，学习者将获得数据化、可视化的学习轨迹分析报告，清楚了解、比较自身与班级平均水平的差异。同时，报告还将综合评价在SPOC学习期间的整体表现，总结其习得知识和技能。该报告可直接用作学生简历或Personal Statement （个人陈述文书）素材。

Instead of traditional transcripts, learners will get a data-based and visualized learning trajectory analysis report to clearly understand and compare the difference between themselves and the average level of the class. At the same time, the report will also comprehensively evaluate the overall performance during the SPOC study period and summarize the acquired knowledge and skills. The report can be used directly as a student's resume or Personal Statement material.

4.综合软实力分析报告
Soft Skill Analysis Report

Blended Learning 课程组与剑桥大学（University of Cambridge) 心理研究中心合作，为有求职需求的同学免费提供综合软实力分析测试，其报告结果将极大程度的帮助学习者为求职提供专业的软实力支持。

Blended Learning course provider cooperates with the Psychological Research Center of the University of Cambridge to provide free comprehensive soft skill analysis tests for students with job requirements. The report results will greatly help learners provide professional soft power support for job hunting.

完成PBL：
Complete PBL

1.导师指导下完成的可发表高质量科研论文
A High-Quality and Publishable Paper

通过PBL课程模块，麻省理工学院顶尖教授、研究员团队将带领学生在项目的某一细分方向进行12周的科学研究和论文写作。学习者完成PBL，即完成一篇完整的、高质量的、可供发表的科研论文。

Through the PBL course module, MIT’s top professors and research team will lead learners in a certain direction in the field of technology (Here to learn about the 12-week scientific research project, from project selection, proposal review, application development to the publication of the paper. The learner completes the PBL, that is, completes a finished, high-quality, and publishable scientific research paper.

2. 教授研究员推荐
Recommendations

PBL阶段，如学习者表现优秀，教学团队会根据对其实际表现的观察亲自撰写相应推荐。表现优异者有机会获得实验室助理实习等工作机会。

At the PBL stage, if the learner performs well, the teaching team will personally write the corresponding recommendation report based on the observation of their actual performance. Outstanding performers have the opportunity to get job opportunities such as laboratory assistant internships.

GTC全球人才计划：
Global Talent Community

GTC的全称为Global Talent Community， 即全球人才计划。课程组将为GTC计划内学生提供各类长期帮扶计划，学生参与并完成SPOC模块即入选人才库计划，无需支付额外费用。

GTC is short for Global Talent Community. Students participating in the SPOC can join this community. Our career coaches will provide all types of assistance for students under the Program at no charge.

1. MIT 线上公开课 & 免费学习资料：课程组不定期发放学习资料，并为学生免费开放MIT线上公开课入场名额。

MIT Online Open Courses & Free Learning Materials. Study materials are distributed from time to time and MIT online open courses are available to students free of charge.

2. 中国顶尖科技企业实习岗位推荐 ：课程组将提供简历修改、投递、直推、面试技巧分享等各类帮扶。

Internship Positions at Top Tech Companies in China. Our team will provide a variety of resume revisions, referrals, interview skills and other career support.

3. 出国留学申请经验分享：课程组团队成员分别来自麻省理工学院、哈佛大学、康奈尔大学、纽约大学、波士顿大学等世界名校，可为学生进行文书写作技巧、申请注意事项等免费指导。

Experience in applying for study abroad. Our team members are from MIT, Harvard, Cornell, New York University, Boston University and other world-renowned universities who can give students free guidance on writing skills, application essays and so on.

4. 美国顶尖科技企业实习岗位推荐：学生在美留学期间，课程组可推荐学生在顶尖科技企业进行实习。

Internship Positions at Top Tech Companies in the United States. While the student is studying in the U. S., our team can refer the student to intern at a top technology company.

Blended Learning
往期参与学生评价
Valuation of Participating Students in the Past

“学习Base SPOC 激发了我去探求的欲望，使我对人工智能有了全新的认知。我现在也更适应在全英文环境下的学习了。”

—— 段同学 哈尔滨工业大学 计算机与科学技术学院 本科一年级 丨 参加Base SPOC

“Learning Base SPOC stimulated my desire to explore and gave me a new understanding of artificial intelligence. I am now more adapted to studying in an English-only environment.”

—— Student Duan, Harbin Institute of Technology, School of Computer and Science and Technology, freshman 丨 Participate in Base SPO

“我高效地了解了人工智能相关技术在科学和工程中的多个交叉应用实例，也悟出了一些本专业研究的新思路。”

—— 徐同学 清华大学航天航空学院 博士生三年级 丨参加Advanced SPOC

"I have effectively learned about multiple cross-application examples of artificial intelligence-related technologies in science and engineering, and I have also realized some new ideas for research in this specialty."

—— Student Xu, Tsinghua University, School of Aeronautics and Astronautics, third-year doctoral student 丨 Participate in Advanced SPOC

“本次PBL由我和组员以及我们的导师共同完成。我们成功在IEEE ICCSEC 2021会议上刊发了名为 Environment and Speaker Related Emotion Recognition in Conversations的论文。我们用3个月完成了PBL并刊发了论文，这对我2021年的求职非常有益！”

—— 钟同学 同济大学 汽车工程学院 研究生二年级 丨 参加NLP PBL项目

"This PBL was completed by me, the team members and our mentor. We successfully published a paper called Environment and Speaker Related Emotion Recognition in Conversations at the IEEE ICCSEC 2021 conference. We completed the PBL and published the paper in 3 months, which is very beneficial to my job search in 2021! "

——Student Zhong, Tongji University, School of Automotive Engineering, second year of graduate study 丨 Participated in the NLP PBL projec

Blended Learning
报名与申请
Registration and Application

课程项目奖学金
Course Scholarship

2021年课程组为参与课程项目同学们准备了一定的 SPOC 和PBL 课程奖学金，需同学们主动申请。详情请联系课程项目顾问老师进行咨询。

In the 2021 spring semester, the course provider has prepared certain SPOC and PBL course scholarships for students participating in the course, and students need to apply for it by themselves. For details, please contact the Program Advisor for consultation.

课程项目咨询及宣讲会报名
Course project consultation and seminar registration

扫描下方二维码添加课程顾问老师并索要具体PBL课程大纲；

Scan the QR code below to add a Program Advisor and ask for a specific PBL course description

请注意添加时务必中文备注姓名，学校，学院及学号方便课程组核对学生信息；

Please notice that the name, school, college and student number must be noted in Chinese when adding a Program Advisor, so that the course provider can check the student information