**（083900）网络空间安全学科2020级全日制学术博士研究生培养方案**

**2020 Full-time PhD Program for Cyberspace Security**

**一、基本信息** Basic Information

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| **适用专业**  Major | 网络空间安全  Cyberspace Security | | | **标准学制**  Duration | 4年Years | |
| **学习形式**  Study Mode | 全日制 Full time | | | | | |
| **项目类型**  Program Type | 学术型Academic | | | | | |
| **培养层次**  Program Level | 普博生 Regular Doctoral Students | | | | | |
| **最低学分**  Min Credit | 18 | **最低GPA学分**  Min GPA Credit | 14 | **最低GPA**  Min GPA | | 2.8 |

**二、学科简介Introduction**

网络安全技术研究院与网络空间安全学院共建"网络空间安全"一级学科，培养包括博士生、硕士生、本科生等不同学历层次的信息安全专业人才。

本学科在学术研究和技术创新领域具有雄厚基础和实力，学科拥有中国工程院院士、长江学者、国家百千万人才、国际知名学者等骨干教授 10余人，拥有信息内容分析技术国家工程实验室、可扩展计算与系统国家重点实验室培育基地、国家商用密码检测（上海）中心（筹）、教育部工程中心、上海市重点实验室等科研基地。对接国际学术前沿和国家发展战略，学科规划的重点研究领域包括：1）密码理论与算法、2）量子计算与后量子密码、3）软件与系统安全、4）硬件与嵌入式系统安全、5）安全体系结构、6）信息内容安全、7）人工智能安全、8）云安全与大数据隐私保护、9）工业互联网、无线网与物联网安全、10）区块链与金融安全。近年来，学科承担了国家自然科学基金重点项目、国家 973 计划、国家重大专项、国家重点研发计划等一批重要科研任务，与 Intel、Microsoft、阿里、百度、腾讯等国内外著名企业开展科研交流与合作，先后获得国家科技进步奖、上海市科技进步奖、国防科学技术奖、密码科技进步奖、国家网络安全人才奖和教师奖、中国密码学会密码创新奖等国家和省部级科研及人才奖励 20 余项。

学科的本科生和研究生主要来自全国百强重点中学和 985/双一流高校，学科声誉、专业热门度和社会关注度都名列前茅。在校学生获得各类国际国内信息安全大赛奖数十项，在 CRYPTO、EUROCRYPT、ASIACRYPT、ACM CCS、NDSS、USENIX Security、ACM Computing Surveys、IEEE TIFS、IEEE TDSC、IEEE TIT、IEEE TCAD、IEEE JSAC 等高水平学术会议和期刊上发表了大量研究论文。90%以上的毕业生分布在世界一流大学或研究机构攻读更高学位或任教、全国一流大学担任重要教职、或全球 500 强企业和国家重要职能部门担任核心骨干。

Cyberspace Security first-level discipline is being jointly built by the Institute of Cyber Science and Technology with the School of Cyber Science and Engineering, aiming to cultivate information security professionals at different levels including bachelors, masters, and doctoral students.

The Cyberspace Security discipline has substantial accumulation and potent in both academic research and technological innovation on cyberspace security. The Cyberspace Security discipline has more than ten world-renowned professors including members of the Chinese Academy of Engineering, national “1000 Talents Program” experts, “Chang Jiang Scholars” distinguished professors, national “Millions of Talent Project”. The Cyberspace Security discipline also has various national and provincial scientific research platforms such as the National Engineering Laboratory for Information Content Analysis Technology, State Key Laboratory Breeding Base for Scalable Computing and Systems. National Commercial Crypto Testing Center in Shanghai (in preparation), Engineering Center of the Ministry of Education of China, Shanghai Key Laboratory, etc. Docking international academic frontiers and national development strategies, the key research areas include: 1) Theory of Cryptography and Algorithms, 2) Quantum Computing and Post-quantum Cryptography, 3) Software and System Security, 4) Hardware and Embedded System Security, 5) Security Architecture, 6) Information Content Security, 7) Artificial Intelligence Security, 8) Cloud Security and Big Data Privacy Protection, 9) Industrial Internet, Wireless Network and Internet of Things Security, 10) Blockchain and Financial Security. In recent years, the Cyberspace Security discipline has undertaken several important research projects including the key projects of the National Natural Science Foundation, the National 973 Plan, the Major National Projects, and the National Key R&D Programs. The Cyberspace Security discipline has subscribed exchanges and firm collaborations with famous Chinese and foreign companies such as Intel, Microsoft, Ali, Baidu, Tencent, etc. Professors of the Cyberspace Security discipline have won more than twenty national, provincial and ministerial level scientific research and talent awards including National Science and Technology Progress Award, Shanghai Science and Technology Progress Award, National Defense Science and Technology Award, Crypto Science and Technology Progress Award, National Cyber Security Talents Award and Teacher Award, China Association of Cryptography Innovation Award, etc.

The majority of the students of the Cyberspace Security discipline comes from the top 100 key high schools and 985/”Double-First” universities in China. The academic reputation, professional popularity, and social attention of the school have always been among the best across the nation. Postgraduate and undergraduate students of the Cyberspace Security discipline have won dozens of prizes in international and domestic information security competitions. A large number of research papers have been published in top academic conferences and journals such as CRYPTO、EUROCRYPT、ASIACRYPT、ACM CCS、NDSS、USENIX Security、ACM Computing Surveys、IEEE TIFS、IEEE TDSC、IEEE TIT、IEEE TCAD、IEEE JSAC, etc. More than ninety percent of the graduates have pursued higher degrees, taken faculty positions in highly ranked international and domestic universities and research institutions, or served as backbone staff in the global top 500 enterprises or important functional departments in the Chinese government.

**三、培养目标** Program Objective

培养适应国家建设需要的，具有学术创新能力和国际视野的德、智、体全面发展的高层次创新型专门人才。

* 热爱祖国，遵纪守法，具有良好的职业道德，具有高度的事业心和追求真理、献身科学的敬业精神，具有高尚的科学道德和创新精神，具有良好的体魄与素养，能积极为社会主义建设服务；
* 至少掌握一门外国语，能熟练地阅读网络空间安全专业的外文资料，具有良好的写作能力和进行国际学术交流的能力；
* 掌握完整、丰富的网络空间安全基础理论和专业知识，了解相关学科的知识；
* 具有良好的自主学习能力，能够实时了解并掌握网络空间安全新理论和新技术；
* 具备理论创新能力、一定的工程实践能力和良好的团队协作能力，能够运用现代科学研究的方法和手段，结合其它学科的发展，在网络空间安全前沿领域找到着力点，进行高水平的基础研究和应用研究。

To meet the needs of the country, the objective of the program for Doctor of Philosophy in cyberspace security is to cultivate high-level and well-rounded professionals with academic innovation and global vision. Precisely speaking:

A). Be patriotic, law-abiding, and preserve a decent professional ethic. Be industrious and devoted to science with academic ethic and pioneering spirit. Be physically robust and serve actively for the development of socialism in China.

B). Master at least one foreign language, be able to browse materials in cyberspace security, writing, reporting, and communicating in that foreign language.

C). Acquire substantial fundamental theory and professional knowledge in cyberspace security and understand the basis of related disciplines.

D). Be able to learn independently and actively keep pace with the development of the theory and technologies of cyberspace security.

E). Be able to innovate, engineer, and team-work. Be capable of conducting advanced basic and applied research in the frontier of cyberspace security with scientific methods and knowledge from other related disciplines.

**四、培养方式及学习年限** Training Mode and Study Duration

网络空间安全学科博士采用全日制学习、导师制培养模式。本项目标准学制4年，未能按时完成学业者，最长可延长2学年。

The cultivation of a Ph.D. in cyberspace security is full-time and tutor-advised. The normal duration of this program is four years, one who fails to meet the criteria of timely graduation can apply for an extension of at most two years.

**五、课程学习要求** Course Requirement

须修读完成不少于18学分，其中GPA学分不少于14（数学类课程至少4学分），GPA不低于2.8。各类课程具体要求如下：

To pursue the degree of this program, one has to earn credits of no less than eighteen, with no less than fourteen credits from GPA courses (at least four credits have to come from mathematics). The GPA has to be no less than 2.8, the detailed requirement of courses are listed as follows:

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| --- | --- | --- | --- | --- |
| **课程类别**  **Course Type** | **学分要求**  **Min Credits** | **门数要求**  **Min Courses** | **GPA 学分要求**  **Min GPA Credit** | **备注**  **Note** |
| 公共基础课 General Courses | 5 | 3 | 3 | FL6001学术英语(2学分)，GE6001学术写作、规范与伦理(1学分)这两门课程为必修、GPA课程。  MARX7001中国马克思主义与当代(2学分)为必修。  FL6001 English for academic purpose (2 credits), and GE6001 Academic writing, norms and ethics (1 credit) are compulsory and GPA source courses.  MARX7001 Development History of Marxist Ideological (2 credits) is compulsory. |
| 专业基础课 Program Core Courses | / | / | / | 数学类课程≥4学分  No less than four credits have to come from maths courses. |
| 专业前沿课 Program Frontier Courses | 2 | 1 | / | GE6012学术报告与研讨会(2学分)，必修  GE6012 Academic reports and seminars (2 credits), compulsory. |
| 专业选修课 Program Elective Courses | / | / | / |  |
| 任意选修课 Elective Courses |  |  |  | 非必需  Not compulsory. |

**六、培养过程要求** Training Requirement

网络空间安全学科博士培养过程包括资格考试、开题报告和年度进展报告等主要环节。其中：

* 本项目资格考试原则上应在入学后第二学年第一学期内完成；对第一次学科资格考试成绩不通过者，可在下一学期申请重考；两次资格考试不通过者，不能继续攻读博士学位。
* 学位论文开题工作应该在通过资格考试后，一般应该在第二学年结束前完成；首次论文开题未通过者，可在下一学期申请重新开题；两次论文开题均不通过者，不能继续攻读博士学位。
* 博士生在完成学位论文开题报告后按自然年进行年度考核。

The program of Ph.D. in cyberspace security involves crucial procedures as the qualification examination, the opening report, and the annual progress report.

A). One who applies for this program should pass the qualification examination in the first school term during the second year after enrollment in principle. One who fails the qualification examination can apply for a reexamination in the next school term. One who fails both examinations cannot proceed to pursue the Ph.D. degree.

B). The opening report could be done after one passing the qualification examination. It should usually be done before the end of the second school year. One who fails the first round of opening report examination can apply for opening again in the next school term. One who fails both examinations cannot proceed to pursue a Ph.D. degree.

C). A Ph.D. candidate has to report his/her progress annually after the opening report.

**七、学术成果要求** Requirement on Academic Achievements

网络空间安全学科学术博士发表学术论文要求：

（1）上海交通大学规定的毕业发表学术论文的要求。

（2）同时须满足发表学术论文的分值累计4分（含4分）以上，并且至少须有1篇以第一作者发表的b)类论文。具体记分规则和论文分类：若本人为第一作者，则该论文的分值系数为1；若导师为第一作者，本人为第二作者，则该论文的分值系数为0.5；其余情况分值系数为0。

a) CCF-A类期刊/会议、中科院一区期刊、 CACR-A类期刊/会议上的论文，计3分（以入学时公布的列表为准，下同）；

b) CCF-B类期刊/会议、中科院二区期刊、 CACR-B类期刊/会议上的论文，计2分；

c) CCF-C类期刊/会议、中科院三区期刊、 CACR-C类期刊/会议上的论文，计1分。

注：对于有多个第一作者或第二作者的上述情况，则1 篇论文只能用于计算1次；对于被列入负面期刊/会议清单的论文，其分值系数为0；对于在专业学术领域内不被认可的期刊/会议上发表的论文，导师或学位委员会有权通过必要的程序将其分值系数认定为0。

A Ph.D. candidate in cyberspace security has to meet the following requirements in academic publications:

1. . Meeting the minimum requirement for graduation formulated by Shanghai Jiao Tong University.
2. . Accumulating no less than four points and being the first author of at least one B)-class paper defined as follows:
3. . A-ranked journals/conferences according to CCF, CACR, and CAS Q1 count for three points (taking the list published at the year of enrollment as the standard, similar for the follows.)
4. . B-ranked journals/conferences according to CCF, CACR, and CAS Q2 count for two points.
5. . C-ranked journals/conferences according to CCF, CACR, and CAS Q2 count for one point.

If the candidate is the first author, then the coefficient for the point is unity. If the adviser is the first author and the candidate is the second author, then the coefficient is zero point five. In other cases, the coefficient is zero.

Remark: In cases of more than one co-first authors: each paper can only count once. For one paper published in journals/conferences in the blacklist, the coefficient would be set to zero. For one paper published in journals/conferences not recognized in this discipline, the academic adviser and degree council have the right of nullifying it after necessary procedures.

**八、学位论文** Thesis/dissertation work

博士研究生在规定的学习年限内完成培养计划,课程成绩合格并达到规定的总学分，符合学校和学科规定的学术论文发表要求，通过学位论文评审且无学术诚信问题者，可申请参加博士学位论文答辩。具体流程按照《上海交通大学关于申请授予博士学位的规定》（<https://www.gs.sjtu.edu.cn/info/1140/7323.htm>）执行。

A Ph.D. candidate who passes all planned courses, earns enough credit, meets the academic paper publication criteria formulated by the university and the school, finishes dissertation review and is clear from academic plagiarism can apply for dissertation defense.

For detailed requirements, please refer to [https://www.gs.sjtu.edu.cn/info/1140/7323.htm](https://www.gs.sjtu.edu.cn/info/1143/5801.htm).

**九、课程设置** Courses

详见下页 Please refer to the next page.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **课程类别**  **Category** | **课程代码**  **Course Code** | **课程名称 Course Name** | | **学分**  **Credit** | **授课语言**  **Language\*** | **开课学期**  **Semester** | **可以计算GPA** | **必须计算GPA** | **备注 Note** |
| **中文Chinese** | **English 英文** |
| 公共基础课  General Courses | FL6001 | 学术英语 | English for Academic Purposes | 2 | 英文 in English | 秋季 Fall | 是 Yes | 是 Yes | 必修 Compulsory |
| GE6001 | 学术写作、规范与伦理 | Academic Writing, Norms and Ethics | 1 | 中文 in Chinese | 春季 Spring | 是 Yes | 是 Yes | 必修 Compulsory |
| MARX7001 | 中国马克思主义与当代 | Development History of MarxistIdeological | 2 | 中文 in Chinese | 秋季 Fall | 是 Yes | 否 No | 必修 Compulsory |
| 专业基础课  Program Core Courses | MATH6010 | 图与网络 | Graph Theory and Network Analysis | 3 | 中文 in Chinese | 秋季 Fall | 是 Yes | 否 No | 数学类课程  ≥ 4学分 |
| NIS7001 | 随机过程与排队论 | Stochastic Process and Queuing Theory | 2 | 中文 in Chinese | 秋季 Fall | 是 Yes | 否 No |
| MATH6005 | 矩阵理论 | Matrix Theory | 3 | 中文 in Chinese | 春季 Spring | 是 Yes | 否 No |
| STAT6001 | 基础数理统计 | Element of Statistics | 3 | 中文 in Chinese | 秋季 Fall | 是 Yes | 否 No |
| NIS7017 | 基础代数 | Foundations of Abstract Algebra | 3 | 中文 in Chinese | 秋季 Fall | 是 Yes | 否 No |
| NIS7006h | 有限域理论及应用 | Finite Fields and Their Applications | 3 | 中文 in Chinese | 秋季 Fall | 是 Yes | 否 No |  |
| NIS7007 | 信息论与编码 | Information Theory and Coding | 3 | 中文 in Chinese | 秋季 Fall | 是 Yes | 否 No |  |
| NIS7008 | 通信理论与系统 | Communication Theory and Systems | 3 | 中文 in Chinese | 春季 Spring | 是 Yes | 否 No |  |
| NIS7009 | 网络空间安全理论与技术基础 | Cyber Security Essentials: Principles and Practice | 2 | 中文 in Chinese | 秋季 Fall | 是 Yes | 否 No |  |
| NIS7018 | 密码学数学基础 | Mathematic Fundamentals of Cryptography | 3 | 中文 in Chinese | 秋季 Fall | 是 Yes | 否 No |  |
| NIS7019 | 密码算法 | Cryptographic Algorithms | 3 | 中文 in Chinese | 春季 Spring | 是 Yes | 否 No |  |
| NIS7020 | 计算机通信网络协议与安全 | Computer Networking Protocol and Security | 3 | 中文 in Chinese | 春季 Spring | 是 Yes | 否 No |  |
| NIS7021 | 软件与系统安全 | Software and System Security | 3 | 中文 in Chinese | 秋季 Fall | 是 Yes | 否 No |  |
| NIS7022 | 网络安全防护原理 | Principles of Cyber Security Protection | 2 | 中文 in Chinese | 春季 Spring | 是 Yes | 否 No |  |
| NIS7023 | 多媒体内容安全 | Multi-media Content Security | 3 | 中文 in Chinese | 秋季 Fall | 是 Yes | 否 No |  |
| NIS7024 | 人工智能安全原理 | Principles of Artificial Intelligence Security | 2 | 中文 in Chinese | 春季 Spring | 是 Yes | 否 No |  |
| NIS7025 | 大数据分析与安全 | Analysis and Security for Big Data | 2 | 中文 in Chinese | 春季 Spring | 是 Yes | 否 No |  |
|  |  |  |  |  |  |  |  |  |
| 专业前沿课  Program Frontier Courses | GE6012 | 学术报告与研讨会 | Academic Reports and Seminars | 2 | 中/英文 in Chinese / English | 春/秋 Spring/Fall | 否 No | 否 No | 必修 Compulsory |
| 专业选修课  Program Elective Courses | NIS8012 | 密码协议 | Cryptographic Protocols | 2 | 中文 in Chinese | 春季 Spring | 否 No | 否 No |  |
| NIS8013 | 高等密码工程 | Advanced Cryptographic Engineering | 2 | 中文 in Chinese | 春季 Spring | 否 No | 否 No |  |
| NIS8014 | 移动网络安全 | Mobile Network Security | 2 | 中文 in Chinese | 秋季 Fall | 否 No | 否 No |  |
| NIS8015 | 网络安全前沿技术 | Advanced Network Security | 2 | 中文 in Chinese | 秋季 Fall | 否 No | 否 No |  |
| NIS8016 | 无线电安全 | Radio Security | 2 | 中文 in Chinese | 秋季 Fall | 否 No | 否 No |  |
| NIS8017 | 漏洞挖掘与分析 | Security Vulnerability Assessment | 2 | 中文 in Chinese | 春季 Spring | 否 No | 否 No |  |
| NIS8018 | 系统安全前沿技术 | Advances in Software and System Security | 2 | 中文 in Chinese | 春季 Spring | 否 No | 否 No |  |
| NIS8019 | 网络渗透测试导引 | Introduction to Network Penetration Testing | 2 | 中文 in Chinese | 秋季 Fall | 否 No | 否 No |  |
| NIS8020 | 区块链原理及应用 | Principle and Applications of Blockchain | 2 | 中文 in Chinese | 春季 Spring | 否 No | 否 No |  |
| NIS8021 | 自然语言处理前沿技术 | Frontier Technology in Natural Language Processing | 2 | 中文 in Chinese | 秋季 Fall | 否 No | 否 No |  |
| NIS8022 | 数字取证前沿技术 | Frontier Technology in Digital Forensics | 2 | 中文 in Chinese | 春季 Spring | 否 No | 否 No |  |
| NIS8023 | 社交网络数据分析 | Data Analysis on Social Networks | 2 | 中文 in Chinese | 春季 Spring | 否 No | 否 No |  |
| 任意选修课 | | Elective Courses | |  | |  |  |  |