

## (085800) 能源动力学科 2020 级非全日制工程博士培养方案(电气系)

2020 Part-time PhD Program for Energy and Power Engineering

### 一、基本信息 Basic Information

|                       |  |                             |              |                   |   |
|-----------------------|--|-----------------------------|--------------|-------------------|---|
| 院系名称<br>School        | (031)电子信息与电气工程学院 (电气系)<br>School of Electronic Information and<br>Electrical Engineering | 适用年级<br>Grade               | 2020 级 Class |                   |   |
| 适用专业<br>Major         | 能源动力<br>Energy and Power Engineering   | 标准学制<br>Duration            | 4 年 Years    |                   |   |
| 学习形式<br>Study Mode    | 非全日制 Part time   |                             |              |                   |   |
| 项目类型<br>Program Type  | 专业型 Professional   |                             |              |                   |   |
| 培养层次<br>Program Level | 普博生 Regular Doctoral Students  |                             |              |                   |   |
| 最低学分<br>Min Credit    | 16   | 最低 GPA 学分<br>Min GPA Credit | 0            | 最低 GPA<br>Min GPA | 0 |

### 二、学科简介 Introduction

本学科始建于 1908 年，是上海交通大学历史最悠久的学科之一。1962 年起下属五个二级学科陆续获得硕士学位授予权，在全国相应学科中均为首批有权授予硕士学位的学科。1999 年设立电气工程学科博士后流动站。2000 年电气工程获得一级学科博士学位授予权，培养电气工程学科的工学博士。本一级学科下属的电力系统及其自动化，电机与电器，高电压及绝缘技术，电力电子与电力传动和电工理论与新技术五个二级学科均开设了博士研究生课程，实行在一级学科范围内选课。

本学科研究与科技创新水平不断提高，拥有一系列重点科研与教育基地，包括“国家能源智能电网(上海)研发中心”，“国家能源海上风电技术装备研发中心”，“电力传输与功率变换控制教育部重点实验室”，“电气绝缘与热老化上海市重点实验室”，“国家工科基础课程电工电子教学基地”，“上海交通大学风力发电研究中心”和“上海交通大学泛在电力物联网智能感知实验室”等。

本学科与美国佐治亚理工、欧盟的意大利都灵理工大学和德国达姆施塔特技术大学开展了联合培养研究生的项目。毕业生主要分布在电力工程设计、电力电网、电气设备设计及制造、新能源等领域。

This discipline was founded in 1908, and is one of the oldest disciplines in Shanghai Jiao Tong University. Since 1962, 5 level-2 disciplines have successively had the right to confer a master's degree, and have been listed into the first group of disciplines with the right to confer a master's degree among national disciplines. A mobile post-doctoral station for electrical engineering was established in 1999. The electrical engineering discipline had the right to confer a doctoral level for level-1 discipline for the purpose of cultivating doctors majoring in electrical engineering in 2000. 5 level-2 disciplines classified into level-1 disciplines (including Power System and Automation, Electric Machines and Electric Apparatus, High Voltage and Insulation Technology, Power Electronics and Electrical Drives, and Theory and New Technology of Electrical Engineering) have opened doctoral student courses, and are selected within the scope of level-1 disciplines.

It also has research centers and labs such as “State Energy Smart Grid R&D Center”, “State Energy Offshore Wind Technology and Equipment R&D Center”, “Power Transmission Conversion and Control Key Lab of MOE”, “Electric Insulation and Thermal Aging Key Laboratory of Shanghai”, “Electric and Electronic Teaching Base of National Basic Science Courses”, “Wind Power Research Center” and “Ubiquitous Power IoT Intelligent Perception Lab”.

This discipline is now carrying out a joint program for training postgraduates with Georgia Institute of Technology of America, Turin Polytechnic University in EU, and Darmstadt Technical University of Germany. The postgraduates of this discipline are mainly distributed to the fields such as electric power engineering design, electric power and electric network, design and manufacture of electrical equipment, and new energy resources.

### 三、培养目标 Program Objective

紧密结合我国经济社会和科技发展需求，面向企业（行业）工程实际，坚持以立德树人为根本，培育和践行社会主义核心价值观，培养在电子与信息工程领域掌握坚实宽广的理论基础和系统深入的专门知识，具备解决复杂工程技术问题、进行工程技术创新、组织工程技术研究开发工作等能力，具有高度社会责任感的高层次工程技术人才，为培养造就工程技术领军人才奠定基础。

Close integrating China's economic, social and technological development needs, facing the actual engineering of enterprises (industries), adhering to the fundamental principle of establishing moral values and educating people, fostering and practicing socialist core values, cultivating high-level engineering and technology talents with a solid and broad theoretical foundation and systematic and in-depth expertise in the field of electronic and information engineering, with the ability to solve complex engineering and technology problems, carry out engineering technology innovation, organize

engineering and technology research and development work, and a high sense of social responsibility, laying the foundation for cultivating and nurturing leading engineering and technology talents.

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

工程博士可采取半脱产或不脱产的方式，学习年限为四年，经申请批准，最长可以延期至七年。

The engineering doctor can take their study on half or not released from their regular work. The study period is generally 4 years, and may be prolonged to 7 years at most upon approval.

#### 五、课程学习要求 Course Requirement

学分 $\geq 16$ ，其中公共课 $\geq 6$ 学分，专业课 $\geq 10$ 学分，课程学习原则上要求1年内完成。

##### 第一部分：公共课

(1) 工程科技前沿专题，1学分； 工程数学，2学分； 学术写作、规范与伦理，1学分；  
中国马克思主义与当代，2学分。

(2) 公共课为必修课程。采取集中授课的模式，由学校研究生院统一安排，一般安排在周六、周日授课。

##### 第二部分：专业课

- (1) 创新工程实践，必修，2学分
- (2) 能源互联网前沿理论与工程，必修，2学分
- (3) 其它专业课程任选，至少6学分

《创新工程实践》的要求:

- (1) 参与相关专业硕士实践类课程的教学或辅导, 不少于 16 学时; 或作重要工程前沿讲座至少 8 次 (每次计 2 个学时);
- (2) 在读期间协助校内导师指导至少 1 名专业学位硕士, 工作量不少于 16 课时;
- (3) 递交《上海交通大学工程博士实践活动总结报告》, 由校内外导师、学院审核通过, 获得本课程学分。

各类课程具体要求如下:

The total credits are no less than 16, the general course shall be no less than 6 credits and the professional courses shall be no less than 10 credits. The doctor courses shall be finished in the first academic year.

#### 1. General Courses:

- (1) General courses are: “Selected topics in Engineering Frontiers” (1 credit), “Mathematics in Engineering” (2 credits), “Scientific Writing, Integrity and Ethics”(1 credit) and “Marxism in China”(2 credits).
- (2) General courses are compulsory courses. Graduate School arranges them in centralized time, generally on Saturdays and Sundays.

#### 2. Program Courses:

- (1) “Innovative Engineering Practice”, compulsory, 2 credits;
- (2) “Frontier Theories and Engineering Advances of Energy Interconnection Network” , compulsory, 2 credits;
- (3) Other program courses, no less than 6 credits.

“Innovative Engineering Practice” Requirements:

- (1) Participate in the teaching or tutoring of relevant professional master's practical courses for more than 16 hours; or give at least 8 important engineering frontier lectures (2 hours each time).
- (2) Assist the supervisor in university to guide at least one professional master, and the workload is not less than 16 hours.

(3) Submit the Summary Report on the Practical Activities of the Doctor of Engineering of Shanghai Jiao Tong University, which will be examined and approved by the instructors inside and outside the university and the Institute.

The specific requirements are as follows:

| 课程类别<br>Course Type                  | 学分要求<br>Min Credits | 门数要求<br>Min Courses | GPA 学分要求<br>Min GPA Credit | 备注<br>Note             |
|--------------------------------------|---------------------|---------------------|----------------------------|------------------------|
| 公共基础课<br>General Courses             | ≥6                  |                     |                            |                        |
| 专业基础课<br>Program Core Courses        |                     |                     |                            |                        |
| 专业前沿课<br>Program Frontier<br>Courses |                     |                     |                            |                        |
| 专业选修课<br>Program Elective<br>Courses |                     |                     |                            |                        |
| 任意选修课<br>Elective Courses            |                     |                     |                            | 非必需<br>Not<br>required |

电气工程研究生学术报告会和讨论会要求:

- 1、学术报告会或讨论会，在个人培养计划中选在第二学期，全年都可以参加，入学第一年内完成。
- 2、参会后需提交由电气系举办的学术报告会记录表，博士研究生要求提交 6 场学术报告会的记录表，每场总结不少于 800 字。电院相关学科的学术报告会也可参加，但不能超过总数的三分之一。

3. 所有选课学生于每年夏季学期第一周周三前以班级为单位，班长按二级学科方向分好收齐后将学术报告电子版反馈到教学秘书邮箱。每位学生的文件电子版反馈命名为：二级学科方向名称+姓名+学号，电气工程系五个二级学科方向为：电力系统、电力电子、电机、高压、电工中心。

电院报告会通知见网站 <http://www.seiee.sjtu.edu.cn/seiee/list/683-1-20.htm>

电气系学术动态见网站 [https://eei.sjtu.edu.cn/news.aspx?info\\_lb=498&flag=498](https://eei.sjtu.edu.cn/news.aspx?info_lb=498&flag=498)

Academic speech and seminar requirements:

1. Academic speech and seminar should be selected in the 2nd semester and can be participated in the whole year. They should be completed within the first academic year.
2. Postgraduate should submit at least 6 record forms after attending the academic speeches organized by the Department of Electrical Engineering. Each record form should include more than 800 words. The relevant subjects academic speeches organized by the Institute can also be participated, but they cannot exceed 1/3 of the total.
3. All the postgraduates should submit the e-edition record form to their class leader before 1<sup>st</sup> Wednesday of the summer semester. Class leaders should classify the forms according to level-2 disciplines and send them to the teaching secretary.

Record form naming rules: level-2 disciplines name + postgraduates name + postgraduates ID

Level-2 disciplines names: Power System and Automation, Electric Machines and Electric Apparatus, High Voltage and Insulation Technology, Power Electronics and Electrical Drives, and Theory and New Technology of Electrical Engineering

Institute academic trends: <http://www.seiee.sjtu.edu.cn/seiee/list/683-1-20.htm>

Department academic trends: [https://eei.sjtu.edu.cn/news.aspx?info\\_lb=498&flag=498](https://eei.sjtu.edu.cn/news.aspx?info_lb=498&flag=498)

## 六、培养过程要求 Training Requirement

非全日制工程博士的资格考试原则上应在入学后第二学年第一学期内完成。博士生学位论文开题工作应该在通过资格考试后，非全日制工程博士一般应该在第二学年结束前完成。

Doctor students should finish the qualification exam in the 3<sup>rd</sup> semester. Eng.D. dissertation proposal should start after passing the qualification exam and finish before the end of the second academic year.

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

工程博士生在读期间应做出创造性成果，成果应与学位论文密切相关，且以上海交通大学博士研究生身份署名，成果形式包括科技奖励、行业标准、发明专利、学术论文等，至少满足以下具体要求之一：

- 1、获省部级以上科技成果奖 1 项，省部级科技成果一等奖需排名前 5 位、二等奖需排名前 3 位；
- 2、以本人贡献为主的研究成果形成行业标准 1 项；
- 3、以第一发明人或第一著作人获得重要发明专利授权或软件著作权至少 2 项，其授权专利技术和软件著作权被应用于工程实践，能提供相关的实施应用证明材料；
- 4、发表学术论文达到电气工程系的学术型博士论文发表要求。

Before applying for the thesis defense, engineering doctoral graduates must submit evaluation materials of the creative achievements obtained during study period. The research results related to the thesis should be signed as a doctoral student of SJTU, which can be one of the following five forms:

1. Be awarded of science and technology prize above provincial level (rank top 5 of 1<sup>st</sup> prize, or rank top 3 of 2<sup>nd</sup> prize);
2. Compile 1 industry standard base on doctoral graduates' research result;
3. Obtain at least 2 important invention patent authorizations or software copyrights with the first inventor or first author. The patent or software copyrights are applied to engineering practice and can provide relevant implementation application certification materials;
4. Public academic papers meet the requirements of the Department of Electrical Engineering.

## 八、学位论文 Thesis/dissertation work

学位论文选题应围绕在读期间作为主要成员承担本行业重大、重点工程项目或技术攻关项目开展，选题应具有重要的工程应用价值。

学位论文研究内容应与解决重大工程技术问题、实现企业技术进步和推动产业升级紧密结合，可以是工程新技术研究、重大工程设计、新产品或新装置研制等，体现工程技术创新能力。

学位论文的形式可为应用研究类、工程设计类和产品研发类。论文应具有较高的应用价值、技术创新及社会经济效益。

The topic of dissertation should focus on the major or key projects in the industry or technical research projects undertaken by the doctor student as main member during the study period. The topic should have important engineering application value.

The research content of the dissertation should be closely related to solving major engineering and technological problems, realizing the technological progress of the enterprise and promoting the upgrading of the industry, which may include research on new engineering technologies, major engineering design, development of new products or new devices, etc., reflecting the innovative capability of engineering technology.

The dissertation can be in the form of applied research, engineering design or product development. The dissertations should have high application value, technological innovation and socio-economic benefits.

## 九、课程设置 Courses

| 课程类别<br>Category         | 课程代码<br>Course Code | 课程名称 Course Name |  | 学分<br>Credit | 授课语言<br>Language* | 开课学期<br>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<br>General Courses | GE9002              | 工程科技前沿专题         | Selected topics in Engineering Frontiers     | 1            | 中文 Chinese in     | 秋季 Fall          | 否 No     | 否 No     | 必修 Compulsory |
|                          | MATH6002            | 工程数学             | Mathematics in Engineering                   | 2            | 中文 Chinese in     | 秋季 Fall          | 否 No     | 否 No     | 必修 Compulsory |
|                          | GE6001              | 学术写作、规范与伦理       | Scientific Writing, Integrity and Ethics     | 1            | 中文 Chinese in     | 春秋季 Spring Fall  | 否 No     | 否 No     | 必修 Compulsory |
|                          | MARX7001            | 中国马克思主义与当代       | Marxism in China                             | 2            | 中文 Chinese in     | 秋季 Fall          | 否 No     | 否 No     | 必修 Compulsory |
| 专业基础                     | AU7012              | 先进工程控制导论         | Introduction to Advanced Engineering Control | 2            | 中文 Chinese in     | 秋季 Fall          | 否 No     | 否 No     |               |



|   |         |              |   |   |                |    |                    |      |      |               |
|---|---------|--------------|---|---|----------------|----|--------------------|------|------|---------------|
| 课<br>Program<br>Core<br>Courses             | EE7002  | 电力系统动态计算与建模  | Power System Dynamics-<br>Computing and Modelling                                     | 3 | 英 文<br>English | in | 春季 Spring          | 否 No | 否 No |               |
|   | EE7003  | 非线性控制理论及应用   | Nonlinear Control Theory<br>and Applications  | 2 | 中 文<br>Chinese | in | 秋季 Fall            | 否 No | 否 No |               |
|   | EE7001  | 博士生电气技术试验    | Electrical Lab for<br>Doctoral Students   | 1 | 中 文<br>Chinese | in | 秋季 Fall            | 否 No | 否 No |               |
|   | EE7006  | 能源互联网前沿理论与工程 | Frontier Theories and<br>Engineering Advances of<br>Energy Interconnection<br>Network | 2 | 中 文<br>Chinese | in | 春季 Spring          | 否 No | 否 No | 必修 Compulsory |
|   | NIS8011 | 网络空间安全前沿专题   | Topics of Cyberspace<br>Security Frontier   | 2 | 中 文<br>Chinese | in | 春季 Spring          | 否 No | 否 No |               |
|   | MEM6306 | 系统创新与工程实践    | System Innovation and<br>Engineering Practice   | 2 | 中 文<br>Chinese | in | 春秋季 Spring<br>Fall | 否 No | 否 No |               |
| 专业前沿<br>课<br>Program<br>Frontier<br>Courses | EE8007  | 电力系统分析专题     | Selected Topics on Power<br>System Analysis   | 3 | 中 文<br>Chinese | in | 秋季 Fall            | 否 No | 否 No |               |
|   | EE8008  | 高电压前沿技术专题    | Advanced High Voltage<br>Techniques   | 3 | 中 文<br>Chinese | in | 春季 Spring          | 否 No | 否 No |               |
|   | EE8009  | 现代电力电子变换技术专题 | Key Issues of Modern<br>Power Electronic<br>Converter Technologies                    | 2 | 英 文<br>English | in | 春季 Spring          | 否 No | 否 No |               |
|   | GE9001  | 创新工程实践       | Innovative Engineering<br>Practice  | 2 | 中 文<br>Chinese | in | 秋季 Fall            | 否 No | 否 No | 必修 Compulsory |
|   | MEM8306 | 新能源技术及应用     | New Energy Technology<br>and Application  | 2 | 中文             |    | 春秋季                | 否    | 否    |               |
|   | GE6012  | 学术报告与研讨会     | Academic Speech and<br>Seminar  | 2 | 中 文<br>Chinese | in | 春季<br>Spring       | 否 No | 否 No | 必修 Compulsory |
| 专业选修<br>课<br>Program                        | MEM8301 | 大数据与互联网思维    | Big Data and Internet<br>Thinking   | 2 | 中 文<br>Chinese | in | 秋季 Fall            | 否 No | 否 No |               |
|   | MEM8302 | 物联网技术与发展趋势   | Technology and Trends<br>for Internet of Things                                       | 2 | 中 文<br>Chinese | in | 秋季 Fall            | 否 No | 否 No |               |

|                           |         |             |   |   |               |    |           |      |      |  |
|---------------------------|---------|-------------|---|---|---------------|----|-----------|------|------|--|
| Elective Courses          | MEM8303 | 人工智能        | Artificial Intelligence                               | 2 | 中文<br>Chinese | in | 春季 Spring | 否 No | 否 No |  |
|                           | MEM8304 | 网络信息安全理论与技术 | Theory and Technology of Network Information Security | 2 | 中文<br>Chinese | in | 秋季 Fall   | 否 No | 否 No |  |
| 任意选修课<br>Elective Courses |         |             |   |   |               |    |           |      |      |  |