# 研究生专业基础课程教学大纲 (Syllabus)

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| 课程代码 Course Code | PHY6008H | *学时 Teaching Hours | 64 | *学分 Credits | 4 |
| *课程名称 Course Name | （中文）物理学中的群论 | | | | |
| | （English）Group Theory in Physics | | | | |
| *授课语言 Instruction Language | English | | | | |
| *开课院系 School | 物理与天文学院 | | | | |
| *先修课程 Prerequisite | *无（若有，请给出具体课程名称及课程代码；若无，请写"无"）* | | | | |

| 授课教师 Instructors | 姓名 Name | 职称 Title | 单位 Department | 联系方式 E-mail |
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| | Yuichiro Nakai | 副教授 | 物理与天文学院 | ynakai@sjtu.edu.cn |
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| *课程简介（中文） Course Description | 课程定位：本课程为物理与天文方向研究生的专业核心课及其它相关专业研究生的专业普及课。<br>先修课程：线性代数、量子力学<br>教学目标与主要内容：群论是研究系统对称性的有效工具。本课程要学习群论的基本理论及其在物理学中应用的基本方法，重点要求掌握群及其线性表示理论，学习正多面体对称群、三维转动群、置换群、空间群等、SU(N)群的基本性质。通过本课程的学习，希望学生掌握群论的基本知识，学会用群论研究物理系统对称性质的基本方法。 |
| *课程简介（English） Course Description | This course, group theory in physics, is a key course for graduate students majoring in Physics and Astronomy and an important course for students in other related majors.<br><br>**Prerequisite:** linear algebra, quantum mechanics<br><br>**Teaching objectives and main contents:** group theory is an effective tool to handle the system symmetry. This course aims to teach the basic theory of group theory and the basic methods of its application in physics, with special emphasis on mastering the theory of group and its linear representation, and |

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<tr><td></td><td colspan="4">learning the basic properties of regular polyhedral symmetry group, three-dimensional rotation group, permutation group, space group, and SU(n) group. Through the study of this course, students are expected to acquire the basic knowledge of group theory and learn the basic method of studying the symmetry properties of physical systems with group theory.</td></tr>
<tr><td rowspan="13">*教学安排<br>Schedules</td><td>教学内容 Content</td><td>授课学时<br>Hours</td><td>教学方式<br>Format</td><td>授课教师<br>Instructor</td></tr>
<tr><td>Basics of Group Theory</td><td>8</td><td>课堂教学</td><td>Yuichiro Nakai</td></tr>
<tr><td>Symmetric Group</td><td>4</td><td>课堂教学</td><td>Yuichiro Nakai</td></tr>
<tr><td>Vector Space</td><td>4</td><td>课堂教学</td><td>Yuichiro Nakai</td></tr>
<tr><td>Group Representations</td><td>8</td><td>课堂教学</td><td>Yuichiro Nakai</td></tr>
<tr><td>Applications of Finite Groups</td><td>4</td><td>课堂教学</td><td>Yuichiro Nakai</td></tr>
<tr><td>Quantum Mechanics and Group Theory</td><td>4</td><td>课堂教学</td><td>Yuichiro Nakai</td></tr>
<tr><td>Continuous Groups and Lie Algebras</td><td>8</td><td>课堂教学</td><td>Yuichiro Nakai</td></tr>
<tr><td>Rotations in 3D Space</td><td>6</td><td>课堂教学</td><td>Yuichiro Nakai</td></tr>
<tr><td>Simple Lie Algebras and Their Representations</td><td>8</td><td>课堂教学</td><td>Yuichiro Nakai</td></tr>
<tr><td>The Group SU(3)</td><td>6</td><td>课堂教学</td><td>Yuichiro Nakai</td></tr>
<tr><td>Classification of Simple Lie Algebras</td><td>4</td><td>课堂教学</td><td>Yuichiro Nakai</td></tr>
<tr><td>*考核方式<br>Grading Policy</td><td colspan="4">Homework assignments : 70%<br>Final exam : 30%<br>Absence in class without reason may cause reduction of points.</td></tr>
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| ***教材/讲义或参考资料 Textbooks & References** | Wu-Ki Tung, “Group Theory in Physics”<br>Howard Georgi, “Lie Algebras in Particle Physics” |
| **备注 Notes** | |

**备注说明：**

1．带*内容为必填项；均为中英文填写。

2．课程简介字数为 300-500 字；教学内容、进度安排等以表述清楚教学安排为宜，字数不限。