# Osaka University International Certificate Program Details

24/3/2025

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| Course Name | Frontier Engineering Science: An Introduction through STEM-Centered Learning | | |
| Course Affiliation | Graduate School of Engineering Science | | |
| Course Manager | Prof. Umakoshi Hiroshi, Graduate School of Engineering Science | | |
| Cooperative Schools | Institute for International Initiatives | | |
| Eligibility | ・Graduate students of ASEAN Campus Partner Universities | | |
| Requirements for completion | 6 to 8 credits | Capacity | 7 |
| Course Objective | In order to contribute to SDGs which are the common challenges on a global scale including ASEAN countries, "STEM (Science, Technology, Engineering, Mathematics) perspectives" is essential. To acquire this perspectives, participants will realize "STEM factors" which are the basis of each theme related to SDGs through frontier researches in Engineering Science (ES) focusing on joint research.<br>In addtion, participants will understand "STEM", which is essential for ES human resources through close communications among laboratory staff, students and exchange students. | | |
| Learning Goals | To acquire the ability to understand 1) the principle of Engineering Science, 2) the role of STEM (Science, Technology, Engineering, Mathematics) which is basic theory of Engineering Science, 3) the relationship between Engineering Scienece, and materials, functions and system, 4) the relationship between Engineering Science and industrial technology innovation such as extreme substances, spintronics, sunlight and future research, and 5) the relationship between Engineering Science and SDGs<br>To gain scientific, technical and humane knowledge as an Engineering Scientist through advanced STEM practices in the fields of Materials physics, Chemistry, Chemical engineering, Frontier materials science, Nonlinear mechanics, Mechanical engineering, Bioengineering, Advanced electronics & optical science, Systems science and applied informatics, Mathematical science and Mathematical science for social systems | | |
| Components | 【Required Subjects】Lecture subjects for 1), 2) and 5) (2 credits)<br>STEM practice subjects for 3) and 4) (Graduate School of Engineering Science) (more than two credits)<br>【Electuve Subjects】Lectures for deepening 1), 2) and 3)<br>Required elective subjects and elective subjects are decided baed on a consultation with a supervisor for STEM practices | | |
| Requirements | To belong to a master course of a graduate school in the fields of science, technology and information or medical science, dentistry and pharmaceutical sciences<br>To have interest in STEM in advanced science technology<br>To be assigned to a laboratory to do STEM practices | | |
| Prior knowledge | To have basic knowledge about mathematics, physics, chemistry and biology at undergraduate level which is essential for ES human resources | | |
| Special Note | All the courses in this program will be given in English. | | |

*ASEAN Campus Partner Universities
https://www.osaka-u.ac.jp/en/international/action/asean

Components

| Course Numbering Code | Course Name | Credits | | | Course Term | Study Hours | Course Affiliation | Notes |
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| | | Common | PSA | Elective | | | | |
| 290858 | Engineering Science: A First Step | 1 | | | winter | 15 | Graduate School of Engineering Science | |
| 88A022 | SDGs in Asia Pacific Region Ⅱ | 1 | | | spring to summer | 15 | Institute for International Initiatives | |
| 88A201/88A204 | Laboratory study Ⅰ | | 1 | | spring to winter | 45 | Institute for International Initiatives | Course Term:Spring, Summer |
| 88A202/88A205 | Laboratory study Ⅱ | | 1 | | spring to winter | 45 | Institute for International Initiatives | Course Term:Spring, Summer |
| 88A203/88A206 | Laboratory study Ⅲ | | 1 | | spring to winter | 45 | Institute for International Initiatives | Course Term:Spring, Summer |
| 290859 | Topics in Engineering Science 1 (Materials Engineering Science) | | | 1 | winter | 15 | Graduate School of Engineering Science | |
| 290860 | Topics in Engineering Science 2 (Mechanical Science and Bioengineering) | | | 1 | spring | 15 | Graduate School of Engineering Science | |
| 290861 | Topics in Engineering Science 3 (System Innovation) | | | 1 | spring | 15 | Graduate School of Engineering Science | |

*Participants have to choose two or three PSA courses