

**2016 Course List and Graduation Requirements for Undergraduate  
Fundamental and Applied Physics (School of Science) Program**

| Course Category □   | Course  | * Notes<br>(offered<br>Academic Year)      | Term                            | No of<br>Credits | Compulsory | Credits                |             |              | Minimum<br>Requirement                                  |      |
|---|---|--|---------------------------------|------------------|------------|------------------------|-------------|--------------|---|------|
|   |   |  |                                 |                  |            | Compulsory<br>Elective | Elective    |              |   |      |
| Basic General<br>Education<br>Courses                             | First Year Seminar                                    |  | I                               | 2                | 2          |                        |             |              | 2   |      |
|   | Language and Culture                                  |  | I, II                           | 12               | 12         |                        |             |              | 12  |      |
|   | Health and Sports Science                             | Health and Sports Science: Lecture         |                                 | I                | 2          | 2                      |             |              |   | 4    |
|   |   | Health and Sports Science: Practicum I     |                                 | II               | 1          | 1                      |             |              |   |      |
|   |   | Health and Sports Science: Practicum II    |                                 | III              | 1          | 1                      |             |              |   |      |
|   | Partial Sum   |  |                                 |                  |            | 18                     |             |              |   | 18   |
|   | *2 Basic Courses in Humanities and Social<br>Sciences | Literature                                 | *1                              | II               | 2          |                        |             |              | 2   | 6    |
|   |   | Comparative Studies of Cultures            | AY 2016                         | I                | 2          |                        |             |              | 2   |      |
|   |   | History                                    | *1                              | II               | 2          |                        |             |              | 2   |      |
|   |   | International Society of Globalization Age | *1                              | I                | 2          |                        |             |              | 2   |      |
| *2 Liberal Education Courses in Humanities<br>and Social Sciences | Past and Present of Democracy                         | AY 2016                                    | I                               | 2                |            |                        |             | 2            | 2   |      |
|   | Introduction to Cultural Studies                      | *1   | II                              | 2                |            |                        |             | 2            |   |      |
|   | Culture and Representation                            | *1   | II                              | 2                |            |                        |             | 2            |   |      |
| Liberal Education Courses in Natural Sciences                     | Biotechnology   |  | I                               | 2                |            |                        |             | 2            | 4   |      |
|   | Modern Biology  |  | II                              | 2                |            |                        |             | 2            |   |      |
|   | Science of Materials                                  |  | III                             | 2                |            |                        |             | 2            |   |      |
|   | Exploration of Japan: From the Outside Looking Inside |  | II                              | 2                |            |                        |             | 2            |   |      |
| *2 Liberal Education Courses in<br>Interdisciplinary Fields       | Introduction to Career Development Theory             |  | I                               | 2                |            |                        |             | 2            | consisting of 2<br>credits from LECNS,<br>see page 1(3) |      |
|   | Special Lecture (Studium Generale)                    |  | I · II                          | 2                |            |                        |             | 2            |   |      |
|   | Preparedness for Imminent Natural Disasters           |  | III                             | 2                |            |                        |             | 2            |   |      |
|   |   |  |                                 |                  |            |                        |             |              |   |      |
| Liberal Arts<br>and Sciences<br>Courses                           | Calculus I  |  | I                               | 2                |            |                        | 2           |              | 6   |      |
|   | Calculus II   |  | II                              | 2                |            |                        | 2           |              |   |      |
|   | Linear Algebra I                                      |  | I                               | 2                |            |                        | 2           |              |   |      |
|   | Linear Algebra II                                     |  | II                              | 2                |            |                        | 2           |              |   |      |
|   | Complex Analysis                                      |  | III                             | 2                |            |                        | 2           |              |   |      |
|   | Fundamentals of Physics I                             |  | I                               | 2                | 2          |                        |             |              | 8   |      |
|   | Fundamentals of Physics II                            |  | I                               | 2                | 2          |                        |             |              |   |      |
|   | Fundamentals of Physics III                           |  | II                              | 2                | 2          |                        |             |              |   |      |
|   | Fundamentals of Physics IV                            |  | II                              | 2                | 2          |                        |             |              |   |      |
|   | Fundamentals of Chemistry I                           |  | I                               | 2                |            |                        |             | 2            | 6   |      |
|   | Fundamentals of Chemistry II                          |  | II                              | 2                |            |                        |             | 2            |   |      |
|   | Fundamentals of Biology I                             |  | I                               | 2                |            |                        |             | 2            |   |      |
|   | Fundamentals of Biology II                            |  | II                              | 2                |            |                        |             | 2            |   |      |
|   | Fundamentals of Earth Science I                       |  | I                               | 2                |            |                        |             | 2            | 1.5   |      |
|   | Fundamentals of Earth Science II                      |  | II                              | 2                |            |                        |             | 2            |   |      |
|   | Laboratory in Physics                                 |  | III                             | 1.5              |            |                        |             | 1.5          |   |      |
|   | Laboratory in Chemistry                               |  | II                              | 1.5              |            |                        |             | 1.5          |   |      |
|   | Laboratory in Biology                                 |  | II                              | 1.5              |            |                        |             | 1.5          |   |      |
|   | Sum for Liberal Arts and Sciences Courses             |  |                                 |                  |            | 26                     | 6           | 17.5         | 49.5  |      |
|   | Basic Specialized<br>Course                           | Compulsory Courses ①                       | Fundamental Physics Tutorial Ia | I                | 1          | 1                      |             |              |   | 22   |
| Fundamental Physics Tutorial Ib                                   |   |  | I                               | 1                | 1          |                        |             |              |   |      |
| Mathematical Physics I  |   |  | III                             | 2                | 2          |                        |             |              |   |      |
| Mathematical Physics II   |   |  | III                             | 2                | 2          |                        |             |              |   |      |
| Mathematical Physics Tutorial I                                   |   |  | III                             | 1                | 1          |                        |             |              |   |      |
| Mathematical Physics Tutorial II                                  |   |  | III                             | 1                | 1          |                        |             |              |   |      |
| Analytical Mechanics I  |   |  | III                             | 2                | 2          |                        |             |              |   |      |
| Statistical Physics I (Thermodynamics)                            |   |  | III                             | 2                | 2          |                        |             |              |   |      |
| Physics Tutorial Ia   |   |  | III                             | 0.5              | 0.5        |                        |             |              |   |      |
| Physics Tutorial Ib   |   |  | III                             | 0.5              | 0.5        |                        |             |              |   |      |
| Electricity and Magnetism   |   |  | IV                              | 2                | 2          |                        |             |              |   |      |
| Quantum Mechanics I   |   |  | IV                              | 2                | 2          |                        |             |              |   |      |
| Analytical Mechanics II   |   |  | IV                              | 2                | 2          |                        |             |              |   |      |
| Physics Tutorial IIa  |   |  | IV                              | 1.5              | 1.5        |                        |             |              |   |      |
| Physics Tutorial IIb  |   | IV   | 1.5                             | 1.5              |            |                        |             |              |   |      |
| Partial Sum   |   |  |                                 |                  | 22         | 0                      | 0           | 22           |   |      |
| Elective Courses ②  |   | Mathematics Tutorial Ia                    |                                 | I                | 1          |                        |             |              | 1   | [23] |
|   |   | Mathematics Tutorial Ib                    |                                 | I                | 1          |                        |             |              | 1   |      |
|   |   | Mathematics Tutorial IIa                   |                                 | II               | 1          |                        |             |              | 1   |      |
|   |   | Mathematics Tutorial IIb                   |                                 | II               | 1          |                        |             |              | 1   |      |
|   |   | Fundamental Physics Tutorial II a          |                                 | II               | 1          |                        |             |              | 1   |      |
|   |   | Fundamental Physics Tutorial II b          |                                 | II               | 1          |                        |             |              | 1   |      |
| Elective Courses ③  | Physical Chemistry I                                  |  | III                             | 2                |            |                        |             | 2            | (-8)  |      |
|   | Earth and Planetary Science                           |  | V                               | 2                |            |                        |             | 2            |   |      |
| Sum   |   |  |                                 |                  | 22         | 0                      | [21]        | [43]         |   |      |
| Compulsory Courses ④  | Quantum Mechanics II                                  |  | V                               | 2                | 2          |                        |             |              | 14  |      |
|   | Statistical Physics II                                |  | V                               | 2                | 2          |                        |             |              |   |      |
|   | Physics Tutorial III                                  |  | V                               | 2                | 2          |                        |             |              |   |      |
|   | Physics Laboratory I                                  |  | V                               | 4                | 4          |                        |             |              |   |      |
|   | Physics Laboratory II                                 |  | VI                              | 4                | 4          |                        |             |              |   |      |
| Compulsory Elective<br>Courses ⑤                                  | Physics Seminar I                                     |  |                                 | 4                |            |                        | 4           |              | 24  |      |
|   | Physics Seminar II                                    |  |                                 | 4                |            |                        | 4           |              |   |      |
|   | Physics Seminar III                                   |  |                                 | 4                |            |                        | 4           |              |   |      |
|   | Physics Seminar IV                                    |  |                                 | 4                |            |                        | 4           |              |   |      |
|   | Physics Seminar V                                     |  |                                 | 4                |            |                        | 4           |              |   |      |
|   | Physics Seminar VI                                    |  |                                 | 4                |            |                        | 4           |              |   |      |
|   | Graduation Research-Theoretical studies               |  | VII, VIII                       | 16               |            |                        | 16          |              |   |      |
| Graduation Research-Experiments                                   |   | VII, VIII                                  | 20                              |                  |            | 20                     |             |              |   |      |
| Elective Courses ⑥  | Mechanics of Continuous Media                         |  | IV                              | 2                |            |                        |             | 2            | [23]  |      |
|   | Biophysics  |  | IV                              | 2                |            |                        |             | 2            |   |      |
|   | Astrophysics  |  | IV                              | 2                |            |                        |             | 2            |   |      |
|   | Optics  |  | VI                              | 2                |            |                        |             | 2            |   |      |
|   | Condensed Matter Physics I                            |  | V                               | 2                |            |                        |             | 2            |   |      |
|   | Particle Physics                                      |  | V                               | 2                |            |                        |             | 2            |   |      |
|   | Chemical Physics                                      |  | V                               | 2                |            |                        |             | 2            |   |      |
|   | Statistical Physics III                               |  | VI                              | 2                |            |                        |             | 2            |   |      |
|   | Physics Tutorial IV                                   |  | VI                              | 1                |            |                        |             | 1            |   |      |
|   | Quantum Mechanics III                                 |  | VI                              | 2                |            |                        |             | 2            |   |      |
|   | Condensed Matter Physics II                           |  | VI                              | 2                |            |                        |             | 2            |   |      |
| Condensed Matter Physics III                                      |   | VII  | 2                               |                  |            |                        | 2           |              |   |      |
| Elective Courses ⑦  | Computer Software I                                   |  | I                               | 2                |            |                        |             | 2            | (-8)  |      |
|   | Computer Software II                                  |  | II                              | 2                |            |                        |             | 2            |   |      |
|   | Fluid Mechanics and Tutorial                          |  | IV                              | 2.5              |            |                        |             | 2.5          |   |      |
|   | Computational Chemistry                               |  | V                               | 2                |            |                        |             | 2            |   |      |
|   | Scientific Measurements                               |  | V                               | 2                |            |                        |             | 2            |   |      |
| Sum   |   |  |                                 |                  | 14         | 24                     | [23]        | [61]         |   |      |
| Sum for Courses in Specialized Fields                             |   |  |                                 |                  | 36         | 24                     | 23          | 83           |   |      |
| <b>Total Sum</b>  |   |  |                                 |                  | <b>62</b>  | <b>30</b>              | <b>40.5</b> | <b>132.5</b> |   |      |

\*1 Check the "Liberal Arts and Sciences Class Timetable-Table B" every semester to find the offering term of the courses in this column.

Please refer to the detail of the Term on the page 1 of 'Student Handbook'.

\*2 Offering term of the courses in this column may be subject to change.

## Graduation Requirements for G30 Undergraduate Fundamental and Applied Physics (School of Science) Program

### 1. Liberal Arts and Sciences Courses: A combined total of at least 49.5 credits must be acquired.

- (1) Basic General Education Courses:  
A total of at least 18 credits must be acquired, consisting of 2 credits from first year seminar A, 12 credits from Japanese/Second Foreign Language, 2 credits of Health and Sports Science: Lecture and at least 2 credits from Health and Sports Science: Practicum courses.
- (2) Basic Courses in Humanities and Social Sciences and Liberal Education Courses in Humanities and Social Sciences:  
A total of at least 6 elective course credits must be acquired from these two Courses Categories.
- (3) Liberal Education Courses in Natural Sciences and Liberal Education Courses in Interdisciplinary Fields:  
A total of at least 4 elective course credits must be acquired from these two Course Categories, consisting of 2 credits from Liberal Education Courses in Natural Sciences.
- (4) Basic Courses in Natural Sciences:  
A total of at least 21.5 credits must be acquired, consisting of 8 compulsory course credits from four Fundamentals of Physics courses and a total of at least 13.5 course credits from the remaining Basic Courses in Natural Sciences, which should include a total of at least 6 compulsory elective course credits from 5 Fundamental Mathematics courses, at least 1.5 course credit from three Laboratory courses, and a total of at least 6 course credits from six elective courses, i.e. Fundamentals of Chemistry I and II, Fundamentals of Biology I and II, and Fundamentals of Earth Science I and II.

### 2. Courses in Specialized Fields: A combined total of at least 83 course credits must be acquired from these course categories.

- (1) Compulsory Courses:  
A total of at least 14 course credits must be acquired from Compulsory Specialized Courses ④, and that of at least 22 course credits must be acquired from Basic Specialized Courses ①.
- (2) Compulsory Elective Courses:  
A total of at least 24 course credits must be acquired from Compulsory Elective Courses ⑤.
- (3) Elective Courses:  
A total of at least 23 course credits must be acquired from Elective Courses ② and ⑥. However a total of at most 8 elective course credits from Elective Courses ③ and ⑦ may be included in the total number of 23 elective course credits.

## Requirements for Advancement for G30 Undergraduate Fundamental and Applied Physics (School of Science) Program

| Time the Judgment is made     | Course Categories and Number of Credits Required  | What treatments the students have to obey  |
|-------------------------------|---|--|
| At the End of the First Grade | A total of a minimum of 20 course credits must be acquired at the end of the first grade. | 1. Students who fail to advance will remain in the first grade.<br>2. The total period of enrollment in the first grade may not exceed 5 years (which equals to the maximum duration of enrollment (8years) minus the duration of enrollment from the second to the fourth year).<br>3. Student who don't advance to the second grade after 5 years of study will be expelled from the school. |