

## SYLLABUS:

|                        |   |
|------------------------|---|
| <b>Date / Revision</b> | 23 May 2015 / 02 May 2017 / PP                                      |
| <b>Faculty</b>         | Life Sciences (LS)  |
| <b>Study Program</b>   | Biomedical Engineering (BME), Chemical Engineering, Food Technology |

## SUBJECT: Introduction to Life Sciences

### 1 Basic Information

|             |                               |   |
|-------------|-------------------------------|---|
| <b>1.01</b> | <b>Subject Name</b>           | <b>Introduction to Life Sciences</b>    |
| <b>1.02</b> | <b>Semester</b>               | 1                                       |
| <b>1.03</b> | <b>Level</b>                  | 1                                       |
| <b>1.04</b> | <b>SKS</b>                    | 1                                       |
| <b>1.05</b> | <b>Mandatory / Curriculum</b> | D-02                                    |
| <b>1.06</b> | <b>Subject Code</b>           | INLS                                    |
| <b>1.07</b> | <b>Subject Code</b>           | BME-FTE-CHE-D-LS-117                    |
| <b>1.08</b> | <b>Year</b>                   | 2017 (7)                                |
| <b>1.09</b> | <b>Quality Control</b>        | Final Test, OFSE, see evaluation        |
| <b>1.10</b> | <b>Limitations</b>            | Min 12 and Max 32 students in one class |
| <b>1.11</b> | <b>Combined with</b>          | All Faculty of Life Sciences Students   |
| <b>1.12</b> | <b>Pre-requisite</b>          | -                                       |
| <b>1.13</b> | <b>Responsible</b>            | Dr. Tutun Nugraha                       |
| <b>1.14</b> | <b>Revision</b>               | 15-05-2017/pp                           |

### 2 Description of Subject

This course will provide exposure to various basic application in the field of life science, particularly that which are related to Biomedical Engineering, Chemical and Pharmaceutical Engineering, and Food Technology. Students are initially engaged in class discussion and some reflection on the impact of technology, and the behaviour of the society on the environment, particularly that which led to various damages in the environment. Furthermore, as scientists and potential future leaders, they must also reflect on their responsibility to continuously uphold the truth, including scientific truth, to back up the decisions as they apply science and technology.

Students are also introduced to the importance of principle of measurements in terms of uncertainties (error) in measurements, the importance of significant figures, dimensional analysis, and interconversion between units particularly between units in S.I. (System Internationale) and units in British/American Units. An example from historical perspective concerning the importance of units conversion in engineering

practice to public safety are also exemplified. Students will also be required to write reports, and make presentations based on their report to make sure they have the chance to learn through practice. The reading of scientific journals are also introduced as part of these assignments. The understanding of what plagiarism and how to avoid it are also part of the class discussion.

### 3 Objectives

This course is a first year course designed to help first semester Life Sciences students to understand better their own chosen field where they will specialize in the future. Discussion will include ethics & responsibility, awareness of environmental impact of human activities particularly industrial activities, technical problem solving and engineering design, teamwork, and communicating to diverse audiences. Special discussion in Biomedical Engineering, Chemical Engineering and Food Process Technologies will also be given to strengthen their understanding.

### 4 Competency

**After having the course, students are expected to**

- become aware that they are part of a community with whom they can share ideas and common interests as well as responsibilities for the good of the society. All of the students in the class will be first year Life Sciences students. They will engage in both lecture and in class discussion. They will be asked to work on group assignments.
- Students will recognize the importance of oral, written, and general academic skills, including teamwork where appropriate. Through group projects, students will build teamwork skills. They will be asked to report on results both in writing and orally.
- Students will gain an awareness of the connections between what they will learn while they are at the university, and the wider world after they graduated. Lectures that covers discussion on the role of science & engineering in history and how it will affect our lives in the future will be tied to the relevance of science and engineering to global societal issues.
- Students will also learn what a graduate of the faculty of Life Sciences do as a Biomedical Engineer, Food Process Engineers, and Chemical Engineers including Pharmaceutical Engineers.

### 5 Learning Approach / Methodology

- Lectures/ Class contact (time-tabled) supplemented with interactive questions and answers to build the projects;
- Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing;
- Student Study Effort: homework/assignment; preparation for test/quizzes/ examination.
- Writing assignments/presentations

### 6 Evaluation

|     |                             |          |
|-----|-----------------------------|----------|
| 5.1 | Absence maximum             | 25%      |
| 5.2 | Participation in Discussion | 5 Points |
| 5.3 | Homework / Classwork        | -        |

|     |                                 |            |
|-----|---------------------------------|------------|
| 5.4 | <b>Presentation /Simulation</b> | 15 Points  |
| 5.5 | <b>Daily Quiz</b>               | 20         |
| 5.6 | <b>Final Examination</b>        | 60 Points  |
|     | <b>Total</b>                    | 100 Points |

## 7 Text Book and Reference

|          |  |
|----------|--|
| <b>1</b> | <p><b>Main Text Book:</b><br/>Miller, G.T and Spoolman, S. E., 2013. Environmental Science. Brooks Cole, Cengage Learning, Int Ed.<br/>Estimated book price: Rp 374,000,-<br/>Steven S. Zumdahl, Susan A. Zumdahl, "Chemistry", Brooks Cole, 9 edition, 2013<br/>Estimated price of book: Rp 400,000,-</p> |
| <b>2</b> | <p><b>Supplement Textbooks:</b><br/>Other sources for current issue discussion and references (papers/journals, news as relevant)</p>  |

## 8 Content / Topics of Lecture

| Week | Content/ Topics of Lecturing  | Text Book Chapter                               | Remark             |
|------|---|---|--------------------|
| 1    | <p><b>Impacts of technologies on the environment</b><br/>Negative effects of mankind activities in their uses of science &amp; technology on the environment: pollution, damage to ecologies, economic disparities, global warming and Climate change</p>   | Lecture and Group discussions<br>1 x 50 minutes | 1 x 1 x 50 minutes |
| 2    | <p><b>Impacts of technologies on the environment</b><br/>Negative effects of mankind activities in their uses of science/engineering on the environment: pollution, damage to ecologies, economic disparities, global warming and Climate change<br/>Assignment: short paper on the effects of technology (take home)</p>   | Lecture and Group discussions<br>1 x 50 minutes | 1 x 1 x 50 minutes |
| 3    | <p><b>The importance of Ethics and Reponsibilities</b><br/>The role of responsibilitis and ethics in preventing and solving the problems discussed in the previous class</p>  | Lecture and Group discussions                   | 2x 1 x 50 minutes  |
| 4    | <p><b>Farsightedness and role-models</b><br/>The importance of role models in the society and the role of scientific/ academic communities in helping to direct the society</p>   | Lecture and Group discussions                   | 2x 1 x 50 minutes  |
| 5    | <p><b>Scientific Decision and Engineering ethics</b><br/>Drawing on some past events, the importance of scientists or engineers in upholding scientific principles are discussed particularly when these principles are in collision with political or financial interest. Such decision may threaten public safety if handled incorrectly.<br/>The events in 1986 during the launching of Space shuttle challenger is taken as the focus of discussion</p> | Lecture and Group discussions<br>1 x 50 minutes | 1 x 1 x 50 minutes |
| 6    | <p><b>The importance of units in engineering</b><br/>Historical perspectives accidents in the use of technologies caused by error in the use of engineering units<br/>Principles of measurement, error in measurements<br/>Understanding the basis of units in engineering (dimensional analysis)</p>   | Lecture and Group discussions<br>1 x 50 minutes |                    |

|        |   |   |                    |
|--------|---|---|--------------------|
| 7      | <b>The importance of units in engineering</b><br>Differences between unit in international Standard (SI) and the imperial units<br>Understanding metric system conversion and conversion from imperial unit system and SI   | Lecture and Group discussions<br>1 x 50 minutes                               | 1 x 1 x 50 minutes |
|        | Midterm Break   |   |                    |
| 9      | <b>The importance of units in engineering</b><br>Review/Class Exercise in Unit conversion   | Quiz/Exercise   | 1 x 1 x 50 minutes |
| 10     | <b>Scientific writing and Communications</b><br>The importance of communication, understanding plagiarisms, class assignment on the role of technologies and ethics<br>Writing papers & Presentations<br>Students writing assignments for each student group in which students are assigned to select a topic relevant to their chosen study programs | Lecture and Group discussions<br>1 x 50 minutes                               | 1 x 1 x 50 minutes |
| 11     | <b>Scientific writing and Communications</b><br>Paper writing & Presentations<br>Students are introduced to reading scientific journals for reference in their writing  | Group discussion to refocus the topics chosen by each group<br>1 x 50 minutes | 1 x 1 x 50 minutes |
| 12     | <b>Scientific writing and Communications</b><br>Research and Development in the field of Biomedical Engineering<br>Invited talk from practicing Biomedical Engineer   | Guest Lecture<br>1 x 50 minutes   | 1 x 1 x 50 minutes |
| 13     | <b>Scientific writing and Communications</b><br>Research and Development in the field of Chemical/Pharmaceutical Engineering<br>Invited talk from practicing Chemical/Parmaceutical Engineers   | Guest Lecture<br>1 x 50 minutes   | 1 x 1 x 50 minutes |
| 14     | <b>Scientific writing and Communications</b><br>Research and Development in the field of Food Technology<br>Invited talk from practicing Food Process Engineers   | Guest Lecture<br>1 x 50 minutes   | 1 x 1 x 50 minutes |
| 15     | <b>Scientific writing and Communications</b><br>Paper writing & Presentations   | Students' Presentations<br>1 x 50 minutes                                     | 1 x 1 x 50 minutes |
| 16, 17 | <b>Final Examination</b>  |   |                    |