

Syllabus for EJU Subject Examinations (Basic Scholastic Ability)

< Science > (with relation to MEXT* curriculum guidelines)

*Ministry of Education, Culture, Sports, Science and Technology

Purpose of the Examination

The purpose of this examination is to test whether students from other countries have the basic scholastic ability in science considered necessary for studying at the undergraduate level at a Japanese university.

The examination consists of physics, chemistry, and biology; examinees select two of these subjects.

The questions are classified according to each of these three subjects; each subject section has questions and a list of relevant terminology.

Biology

Continuity of life . . . **Biology**

1 . Cell

(1) Cell function and structure

- Eukaryotic and prokaryotic cells
- Cellular transport and cell membrane permeability
- Cell function and enzyme

(2) Cellular multiplication and structure of organism

- Unicellular and multicellular organisms
- Somatic division (mitosis)
- Cell differentiation, tissue and organ

2 . Reproduction and embryonic development

(1) Reproductive cell formation and fertilization

- Kinds of reproduction
- Gametogenesis and fertilization in animals
- Gametogenesis, fertilization, and embryogenesis in plants

(2) Mechanism of animal development

- Development process
- Development mechanism

3 . Heredity

(1) Law of inheritance

- Mendel's law of inheritance
- Examples of inheritance

(2) Gene and chromosome

- Linkage, recombination, and chromosome map
- Sex chromosome and sex determination
- Sex-linked inheritance
- Transformation, bacteriophage infection in host cell
- DNA double helix structure

Environment and biological response ... Biology

1 . Environment and animals response

(1) Body fluid and homeostasis

- Role and circulation of body fluid
- Principle of homeostasis
- Autonomic nervous and hormone
- Defense of body against infection

(2) Reception of stimulus and response

- Acceptor
- Nerve and excitation conduction system
- Role of central nervous system
- Animal behavior

2 . Environment and plants response

(1) Plant life and environment

- Water absorption and transpiration
- Photosynthesis and environment

(2) Response and regulation of plants

- Germination
- Growth
- Flower bud formation
- Tropism

Organism and substance ... Biology

1 . Protein and its function in organism

(1) Biochemical reaction and enzyme

- Metabolism and enzyme
- Property of enzyme

(2) Assimilation and dissimilation

- Energy metabolism and ATP
- Photosynthesis
- Nitrogen assimilation
- Respiration and microstructure of cell, respiration and enzyme

(3) Protein function

- Protein structure and function
- Immunity
- Muscular contraction
- Membrane transport and intercellular communication

2 . Genetic information and its expression

(1) Genetic information and protein synthesis

- Structure and replication of DNA
- Genetic code and protein synthesis
- Mechanism of phenotypic expression
- Difference in phenotypic expression between prokaryotic and eukaryotic cells

(2) Phenotypic expression and morphogenesis

- Control of transcription
- Cell differentiation, morphogenesis, and genetic information

(3) Biotechnology

- Genetic recombination
- Tissue culture, nuclear transplantation, cell fusion, etc.
- Application of gene engineering