



# GRE<sup>®</sup>

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We invite  
you to  
**Take a  
Closer  
Look...**

For more information about this GRE Subject Test, contact the GRE Program:

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## The GRE<sup>®</sup> Biochemistry, Cell and Molecular Biology Test

Does your graduate department require or recommend that graduate applicants take the Biochemistry, Cell and Molecular Biology Subject Test offered by the *Graduate Record Examinations<sup>®</sup>* Program?

This Subject Test can be very useful in distinguishing among candidates whose credentials are otherwise similar. The test measures undergraduate achievement and provides a common yardstick for comparing the qualifications of students from a variety of colleges and universities with different standards. Consider these factors:

### **Predictive validity**

Subject Test scores are a valid predictor of graduate school performance, as confirmed by a recent meta-analysis performed by independent researchers of over 1,700 studies containing validity data for GRE tests.\* This study showed that GRE Subject Tests are reliable predictors of a range of outcome measures, including first-year graduate grade-point average, cumulative graduate grade-point average, comprehensive examination scores, publication citation counts, and faculty ratings. For more information about the predictive validity of the GRE tests, visit [www.ets.org/gre/validity.html](http://www.ets.org/gre/validity.html).

### **Content that reflects today's curricula**

The test contains about 180 multiple-choice questions covering topics representing three major areas: biochemistry, cell biology, and molecular biology and genetics. Along with the total score, you receive a subscore in each of these areas to aid in guidance and placement. A detailed list of test content areas can be found on the back of this sheet. Many questions require problem-solving skills and analysis based on descriptions of laboratory situations, diagrams, or experimental results. Additional information about the test and a full-length practice test are provided FREE with test registration and can be downloaded at [www.ets.org/gre/greprep](http://www.ets.org/gre/greprep).

### **Developed by leading educators in the field**

The content and scope of each edition of the test are specified and reviewed by a distinguished team of undergraduate and graduate faculty representing colleges and universities across the country.

\*Source: "A comprehensive meta-analysis of the predictive validity of the Graduate Record Examinations<sup>®</sup>: Implications for graduate student selection and performance." Kuncel, Nathan R.; Hezlett, Sarah A.; Ones, Deniz S., *Psychological Bulletin*, January 2001, Vol. 127(1), 162-181.

## Who develops the GRE Biochemistry, Cell and Molecular Biology Test?

Individuals who serve or have recently served on the Committee of Examiners are faculty members from the following institutions:

Boston College  
California State University - Fullerton  
Clemson University  
Dartmouth College  
Davidson College  
Haverford College  
Middlebury College  
University of California, Riverside  
University of Florida  
University of Oregon  
University of Pennsylvania  
University of Wisconsin  
Virginia Commonwealth University

Committee members are selected with the advice of the American Society for Biochemistry and Molecular Biology, the American Society for Cell Biology, the American Society for Microbiology, the Genetics Society of America, and the American Physiological Society.

Test questions are written by committee members and by other subject-matter specialists from ETS and colleges and universities across the country.

75983-56043 • WEBPDF118  
I.N. 749434

## Test Content

### I. BIOCHEMISTRY (36%)

#### A. Chemical and Physical Foundations

Thermodynamics and kinetics  
Redox states  
Water, pH, acid-base reactions and buffers  
Solutions and equilibria  
Solute-solvent interactions  
Chemical interactions and bonding  
Chemical reaction mechanisms

#### B. Structural Biology: Structure, Assembly, Organization, and Dynamics

Small molecules  
Macromolecules  
Supramolecular complexes

#### C. Catalysis and Binding

Enzyme reaction mechanisms and kinetics  
Ligand-protein interaction

#### D. Major Metabolic Pathways

Carbon, nitrogen, and sulfur assimilation  
Anabolism  
Catabolism  
Synthesis and degradation of macromolecules

#### E. Bioenergetics

Energy transformations at the substrate level  
Electron transport  
Proton and chemical gradients  
Energy coupling

#### F. Regulation and Integration of Metabolism

Covalent modification of enzymes  
Allosteric regulation  
Compartmentation  
Hormones

#### G. Methods

Spectroscopy  
Isotopes  
Separation techniques  
Immunotechniques

### II. CELL BIOLOGY (28%)

Methods of importance to cellular biology, such as fluorescence probes and imaging, will be covered as appropriate within the context of the content below.

#### A. Cellular Compartments of Prokaryotes and Eukaryotes: Organization, Dynamics and Functions

Cellular membrane systems  
Nucleus  
Mitochondria and chloroplasts

#### B. Cell Surface and Communication

Extracellular matrix  
Cell adhesion and junctions  
Signal transduction  
Receptor function  
Excitable membrane systems

#### C. Cytoskeleton, Motility, and Shape

Regulation of assembly and disassembly of filament systems  
Motor function, regulation and diversity

#### D. Protein, Processing, Targeting, and Turnover

Translocation across membranes  
Posttranslational modification  
Intracellular trafficking  
Secretion and endocytosis  
Protein turnover

#### E. Cell Division, Differentiation and Development

Cell cycle, mitosis, and cytokinesis  
Meiosis and gametogenesis  
Fertilization and early embryonic development

### III. MOLECULAR BIOLOGY AND GENETICS (36%)

#### A. Genetic Foundations

Mendelian and non-Mendelian inheritance  
Transformation, transduction, and conjugation  
Recombination and complementation  
Mutational analysis  
Genetic mapping and linkage analysis

#### B. Chromatin and Chromosomes

Karyotypes  
Translocations, inversions, deletions and duplications  
Aneuploidy and polyploidy  
Structure  
Epigenetics

#### C. Genomics

Genome structure  
Physical mapping  
Repeated DNA and gene families  
Gene identification  
Transposable elements  
Bioinformatics  
Proteomics

#### D. Genome Maintenance

DNA replication  
DNA damage and repair  
DNA modification  
DNA recombination and gene conversion

#### E. Gene Expression

The genetic code  
Transcription/transcriptional profiling  
RNA processing  
Translation

#### F. Gene Regulation

Positive and negative control of the operon  
Promoter recognition by RNA polymerases  
Attenuation and anti-termination  
Cis-acting regulatory elements  
Trans-acting regulatory factors  
Gene rearrangements and amplifications

#### G. Viruses

Genome replication and regulation  
Virus assembly  
Virus-host interactions

#### H. Methods

Restriction maps and PCR  
Nucleic acid blotting and hybridization  
DNA cloning in prokaryotes and eukaryotes  
Sequencing and analysis  
Protein-nucleic acid interaction  
Transgenic organisms  
Microarrays



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