



## Biotechnology Explorer™ Educational Products

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## Captivating Science Education

### Do You Have Teaching Responsibilities?

The Biotechnology Explorer™ program makes it easy for educators to meet AAAS and NSF's goals for Vision and Change in Undergraduate Biology Education. The program provides kits, a textbook, and modular lab series that bring project-based learning and research skills into the classroom. Meet the challenge to:

- Integrate core concepts and competencies throughout your curriculum
- Focus on student-centered and project-based learning
- Engage the biology community in the implementation of change

For more information about the products listed here, request the current Biotechnology Explorer catalog (bulletin 2112) or visit [explorer.bio-rad.com](http://explorer.bio-rad.com).



#### **New** Photosynthesis and Cellular Respiration Kit

Our new ThINQ!™ Investigation kit facilitates inquiry and helps you teach many important photosynthesis and cellular respiration concepts. This laboratory kit offers value and features:

- Ease of use with consistent results
- Student-generated quantifiable data
- Alignment with AP Biology learning objectives and the American Association for the Advancement of Science (AAAS) Vision and Change program
- Long-life algae beads for multiple lab sessions

Your students will explore photosynthesis and cellular respiration using easy-to-handle algae beads and a simple colorimetric assay. The kit includes supplies for six inquiry labs (32 students):

- Algae beads
- CO<sub>2</sub> indicator
- Debeading solution
- trUView™ cuvettes
- Disposable plastic transfer pipets, sterile
- Microcentrifuge tubes, 2 ml
- Indicator color guide
- Inquiry-based curriculum
- Teacher manual
- Student manual
- Online teaching resources



The curriculum for your class includes:

#### **Inquiry-Based Curriculum**

- 3 pre-lab activities
- 6 hands-on inquiry labs
- Science case study
- Post-lab assessment questions

#### **Teacher Manual**

- Step-by-step teacher preparation instructions
- Teachable moment suggestions
- Answer key
- Sample experimental design and datasets

#### **Student Manual**

- ThINQ! and focus questions to guide student inquiry and experimental design

For More Information  
Web: [bio-rad.com/algae1](http://bio-rad.com/algae1)

**Ordering Information**

Catalog # Description

Inquire **Photosynthesis and Cellular Respiration Kit**, includes algae beads, colorimetric indicator solution, ThINQ! teacher and student manuals, and other accessories; provides materials for 32 students or 8 workstations

EDU price discounts are for qualified educational institutions and educators only. Items are available at list price for noneducators (must be ordered without an EDU suffix).

**Fish DNA Barcoding Kit**

What happens if one fish gets substituted for another? Most of the time, the consumer won't even notice. But what happens if substituting a less expensive fish for a more expensive one becomes a common practice? Or if a poisonous fish like pufferfish makes it into our food supply, or we deplete our oceans of critically endangered species? Bio-Rad's Fish DNA Barcoding kit helps students answer these and similar real-world questions,

contributing to the global species barcoding initiative while also learning advanced genetic analysis skills.

- Real-world application
- Inquiry-based hands-on laboratory
- Aligns with AP Biology Big Ideas 1, 2, 3, and 4

**For More Information**  
 Web: [bio-rad.com/fishbarcoding](http://bio-rad.com/fishbarcoding)

Fish DNA Barcoding Flowchart



**Ordering Information**

Catalog # Description

1665100EDU **Fish DNA Barcoding Kit**, includes reagents for DNA extraction and PCR for up to 16 fish samples. Purchase sequencing module (US only) separately

1665115EDU **DNA Barcoding Sequencing Module**, prepaid sequencing service for up to 9 samples. Includes shipping of samples. Valid only for use with 1665100EDU. U.S. only

EDU price discounts are for qualified educational institutions and educators only. Items are available at list price for noneducators (must be ordered without an EDU suffix).

**Biotechnology: A Laboratory Skills Course**

This laboratory textbook blends textbook theory with hands-on laboratory activities and real-world applications for your biotechnology course, and it incorporates Biotechnology Explorer™ kits for easy implementation supported by live technical support. This textbook encourages the next generation of biotechnologists by:

- Developing key skills with multiple activities
- Encouraging students to consider the broader implications of biotechnology with bioethics case studies
- Broadening occupational awareness with profiles of careers in biotech
- Letting students answer a research question using independent research



The teacher supplement provides a thorough background on preparation, setup, results analysis, and assessment. It also provides guidance on how to implement and build your biotechnology course. Chapters include:

- The Biotechnology Industry
- Laboratory Skills
- Microbiology and Cell Culture
- DNA Structure and Analysis
- Bacterial Transformation and Plasmid Purification
- Polymerase Chain Reaction
- Protein Structure and Analysis
- Immunological Applications
- Research Projects

**For More Information**  
 Web: [explorer.bio-rad.com/textbook](http://explorer.bio-rad.com/textbook)

**Ordering Information**

Catalog #	Description
1661027EDU	<b>Biotechnology: A Laboratory Skills Course</b> , teacher edition, includes one student edition and one teacher supplement
1661025EDU	<b>Biotechnology: A Laboratory Skills Course</b> , student edition
1661026EDU	<b>Biotechnology: A Laboratory Skills Course</b> , teacher supplement
1661051EDU	<b>Laboratory Notebook</b>
1661052EDU	<b>Supplementary Materials DVD Set</b>

EDU price discounts are for qualified educational institutions and educators only. Items are available at list price for noneducators (must be ordered without an EDU suffix).

## Project-Based Learning Modular Laboratory Explorer Series

### Integrated College Level Molecular Biology Labs

Looking for authentic project-based learning lab experiences that carry a gene or protein of interest from isolation to analysis? Bio-Rad's modular lab series provide validated procedures, easy preparation, and reproducible success year after year. Visit [bio-rad.com/ad/college01](http://bio-rad.com/ad/college01) to learn about our advanced series for cloning, sequencing, bioinformatics, and protein expression and purification using affinity chromatography. These flexible, modular lab series can be used as capstone projects or a complete molecular biology course.

**NEW AND IMPROVED**

**Cloning and Sequencing Explorer Series\***

1. Nucleic Acid Extraction
2. GAPDH PCR
3. Electrophoresis
4. PCR Kleen™ Spin Purification
5. Ligation and Transformation
6. Microbial Culturing
7. Aurum™ Plasmid Mini Purification
8. Sequencing and Bioinformatics

**Protein Expression and Purification Series\***

1. Growth and Expression
2. SDS-PAGE Electrophoresis
3. Purification Process Options:
  - Centrifugation Purification
  - Hand-Packed Column Purification
  - Prepacked Cartridge Purification
4. DHFR Enzymatic Assay
5. Assessment

\* Available as a complete series or as individual modules.

**For More Information**

Web: [explorer.bio-rad.com/cloninglab](http://explorer.bio-rad.com/cloninglab)  
[explorer.bio-rad.com/proteinpurification](http://explorer.bio-rad.com/proteinpurification)



### Ordering Information

Catalog #	Description
1665000EDU*	<b>Complete Cloning and Sequencing Explorer Series</b> , includes all 8 modules and curriculum resource CD (sequencing service not included)
1665005EDU*	<b>Nucleic Acid Extraction Module</b>
1665010EDU*	<b>GAPDH PCR Module</b>
1660451EDU	<b>Electrophoresis Module</b>
7326300EDU	<b>PCR Kleen Spin Purification Module</b>
1665015EDU*	<b>Ligation and Transformation Module</b>
1665020EDU	<b>Microbial Culturing Module</b>
7326400EDU	<b>Aurum Plasmid Mini Purification Module</b>
1665025EDU*	<b>Sequencing and Bioinformatics Module</b> , includes sequencing primers, control plasmid, and bioinformatics subscription; sequencing service not included
1665001EDU	<b>Curriculum Resource CD</b>
1665040EDU*	<b>Protein Expression and Purification Series</b> , centrifugation purification process
1665045EDU*	<b>Protein Expression and Purification Series</b> , hand-packed purification process
1665050EDU*	<b>Protein Expression and Purification Series</b> , prepacked purification process
1665070EDU	<b>Protein Expression and Purification Series Assessment Module</b> , formative and summative assessment tool
1665055EDU*	<b>Growth and Expression Module</b>
1665060EDU*	<b>SDS-PAGE Electrophoresis Module</b>
1665041EDU	<b>Centrifugation Purification Module</b>
1665046EDU	<b>Hand-Packed Purification Module</b>
1665051EDU	<b>Prepacked Purification Module</b>
1665065EDU*	<b>DHFR Enzymatic Assay Module</b>

\* Ships with both temperature-sensitive and room temperature components. Immediately store temperature-sensitive items at 4°C or -20°C as indicated.

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## Rapid Blotting and V3 Western Workflow™

### V3 Western Workflow™ (stain-free rapid blotting)

#### Western Blotting in Less than 2 Hours!

The new rapid blotting or V3 Western Workflow (stain-free rapid blotting) allows you to complete the entire western blot workflow in less than 2–5 hours in the classroom, depending on which time-saving steps are incorporated. TGX Stain-Free™ gels combined with the super-fast Trans-Blot® Turbo™ transfer system provide maximum time savings, allowing you to complete the workflow in less than a single 3-hour lab block. Teach students about the exciting new chemistry that allows visualization of samples separated on PAGE gels without staining.

Benefits:

- Time savings
- Stain-free

**For More Information**

Web: [explorer.bio-rad.com/rapidblotting](http://explorer.bio-rad.com/rapidblotting)

#### Hands-On Time Expenditure (in minutes)

	Tank blotting	Rapid blotting (staining required)	V3 Western Workflow (stain-free rapid blotting)
Protein extraction and electrophoresis	33	33	33
Protein visualization	180	180	<3
Protein transfer			
Equilibration	15	0	0
Setup	30	5	5
Transfer	30–150	15	15
Immunoblotting	45	45	45
Color detection	All 10 min–overnight		
Total hands-on time	343–463 (5 hrs 43 min to 7 hrs 43 min)	288 (4 hrs 48 min)	111 (1 hr 51 min)

**Total Time Savings of 55 min to 7 1/2 hrs**

### Ordering Information

Catalog #	Description
1662875EDU	<b>Rapid Blotting and V3 Western Workflow Starter Kit</b> , comprehensive protein classroom study kit, includes protein profiler module (#1662700EDU), western blot module (#1662800EDU), Trans-Blot Turbo mini nitrocellulose transfer pack, TGX Stain-Free gels, application note, for 32 students

EDU price discounts are for qualified educational institutions and educators only. Items are available at list price for noneducators (must be ordered without an EDU suffix).

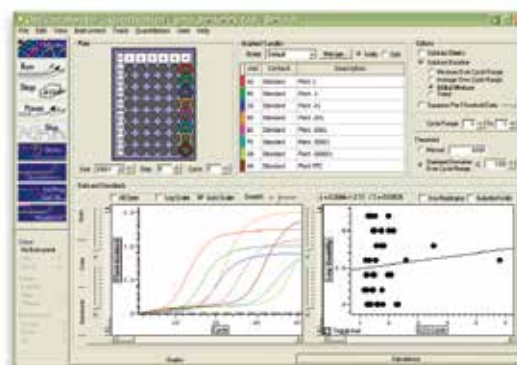
## Real-Time PCR

### Real-Time PCR Kits

#### How much DNA Is There?

The Bio-Rad® Crime Scene Investigator PCR Basics™ kit is a good starting point for novices to become familiar with real-time PCR techniques using real-time PCR technology. Additionally, DNA fingerprints can still be investigated using gel electrophoresis and melt curve analysis, showing how real-time and standard PCR can be complementary techniques.

The Bio-Rad® GMO Investigator™ kit is a tool for teaching the principles of PCR and its use in testing foods for genetic modifications. Demonstrate how much plant DNA is present and then compare how much genetically modified organism (GMO) DNA is recovered from each food sample when using real-time PCR. It is even possible to determine what fraction of a food product has been made with genetically modified ingredients in the same manner standard testing labs do.



- Quantify DNA
- Discover key differences between standard and real-time PCR analysis
- Analyze and evaluate real-time PCR results
- Perform melt curve analysis
- Determine the accuracy and reliability of pipetting techniques
- Learn DNA amplification using real-time PCR

#### For More Information

Web: [explorer.bio-rad.com/real-time](http://explorer.bio-rad.com/real-time)

### Ordering Information

Catalog #	Description
1662660EDU	<b>Crime Scene Investigator PCR Basics Real-Time PCR Starter Kit</b>
1662560EDU	<b>GMO Investigator Real-Time PCR Starter Kit</b>

EDU price discounts are for qualified educational institutions and educators only. Items are available at list price for noneducators (must be ordered without an EDU suffix).



## Classroom Kits

### Biotechnology Explorer™ Kits

Biotechnology Explorer kits address the critical need for inquiry-based activity — an important component of scientific literacy for an educated citizenry and a launch point of experience and practical training for students interested in careers in biotechnology. The kits range from introductory to advanced topics, including courses guiding students through entire molecular biology workflows.

Areas of biotechnology applications covered include:

- Transformation and microbiology
- Protein analysis and chromatography
- DNA analysis
- PCR amplification
- Fully developed course series in DNA and protein



### Ordering Information

Catalog #	Description
1665075EDU	<b>IDEA Kit — Inquiry Dye Electrophoresis Activity</b> , provides materials for 32 students or 8 workstations
1665080EDU	<b>STEM Electrophoresis Teacher Demonstration Kit</b> , provides materials for 8 students or 2 workstations
1665090EDU	<b>STEM Electrophoresis Classroom Kit</b> , provides materials for 32 students or 8 workstations
1660003EDU	<b>pGLO Bacterial Transformation Kit</b> , provides materials for 32 students or 8 workstations
1660013EDU*	<b>pGLO Kit SDS-PAGE Extension</b> , provides materials for 32 students or 8 workstations
1660005EDU*	<b>Green Fluorescent Protein (GFP) Chromatography Kit</b> , provides materials for 32 students or 8 workstations
1660006EDU*	<b>Secrets of the Rainforest Kit</b> , provides materials for 32 students or 8 workstations
1665030EDU	<b>Microbes and Health Kit</b> , provides materials for 32 students or 8 workstations
1660500EDU	<b>Long-Wave UV Lamp</b> , requires 4 AA batteries
1660530EDU	<b>Long-Wave UV Penlight</b>
1660008EDU	<b>Size Exclusion Chromatography Kit</b> , provides materials for 32 students or 8 workstations
1662900EDU*	<b>Got Protein? Kit</b> , provides materials for 320 students or 80 workstations
1662400EDU*	<b>ELISA Immuno Explorer Kit</b> , provides materials for 48 students or 12 workstations
1662700EDU*	<b>Comparative Proteomics Kit I: Protein Profiler Module</b> , provides materials for 32 students or 8 workstations
1662800EDU*	<b>Comparative Proteomics Kit II: Western Blot Module</b> , provides materials for 32 students or 8 workstations
1665035EDU*	<b>Biofuel Enzyme Kit</b> , provides materials for 32 students or 8 workstations
1660007EDU*	<b>Forensic DNA Fingerprinting Kit</b> , provides materials for 32 students or 8 workstations
1660001EDU*	<b>Analysis of Precut Lambda DNA Kit</b> , provides materials for 32 students or 8 workstations
1660002EDU*	<b>Restriction Digestion and Analysis of Lambda DNA Kit</b> , provides materials for 32 students or 8 workstations
1662300EDU	<b>Genes in a Bottle Kit</b> , includes 1 DNA extraction module (#1662000EDU) and DNA necklace module (#1662250EDU); provides materials for 36 students or 9 workstations
1662600EDU*	<b>Crime Scene Investigator PCR Basics Kit</b> , provides materials for 32 students or 8 workstations
1662100EDU*	<b>PV92 PCR Informatics Kit</b> , provides materials for 32 students or 8 workstations
1662500EDU*	<b>GMO Investigator Kit</b> , provides materials for 32 students or 8 workstations

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