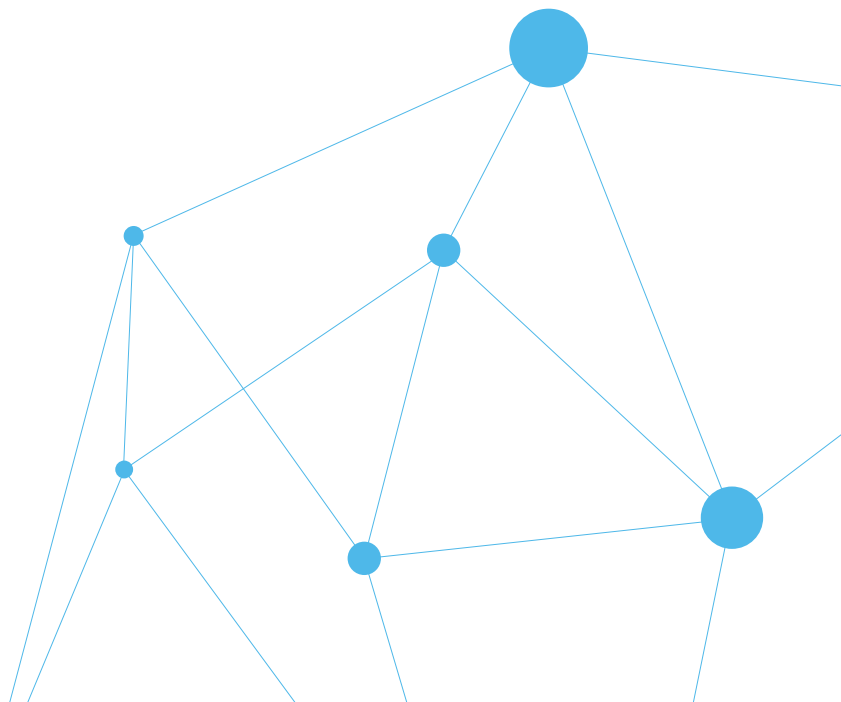


E

Gene/mRNA Synthesis

- 01. Gene Synthesis
- 02. mRNA Synthesis



01. Gene Synthesis

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Gene Synthesis Service

Gene synthesis service of the first and the largest scale in KOREA

Gene synthesis service provides genes with 100% accuracy by only using the gene sequence information given by the customers. In 1995, we started the first gene synthesis service in Korea and have supplied numerous synthetic genes to date, and have developed synthetic methods for various kinds of gene sequences. In addition, we provide the lowest price Gene Synthesis Service in Korea by building a batch production system from genetic raw materials.

We also offer Mutagenesis, Gene Cloning Service, and Rapid Gene Synthesis Service to ensure fast synthesis period. Bioneer is doing its best to reduce the delivery time and supply the lowest price through continuous research and development.

With Bioneer's first protein auto synthesizer, *ExiProgen™*, you can get up to 16 proteins from synthetic genes in less than six hours.

○ Service Description

Empower your research with Bioneer's Custom Gene Synthesis Services.

Based on 20 years of oligo synthesis technology, molecular biology technology and know-how, we provide Gene Synthesis Service all over the world. Even if you only know the sequence of protein or unobtainable genes or artificial, you can get 100% matched gene quickly. Gene Synthesis Service provides economical price, accurate quality and codon optimization.

○ Features and Benefits

▪ Fast and economical service

Fast and inexpensive service by building a batch production system from genetic raw materials to ultra-fast oligo synthesizers.

▪ Accurate quality

Guaranteed 100% sequence using Automatic DNA sequencer (ABI 3730)

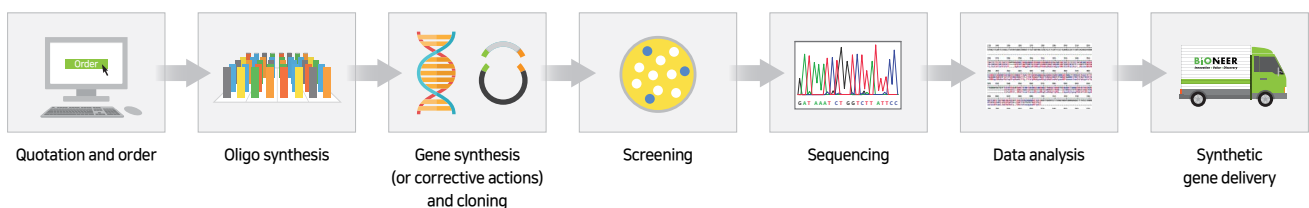
▪ Codon Optimization Service

Optimizing protein expression by codon optimization of accumulated know-how.

▪ Various vector selection

Choose from a variety of vectors to suit your needs at an affordable price.

○ Procedure



○ Applications

▪ Improve protein productivity

By optimizing codons for each expression host such as *E. coli* and animal cell lines, it is possible to increase the efficiency of protein expression as much as possible to increase the productivity of various proteins such as biosimilars and enzymes more than twice.

▪ Improve protein function

Based on the protein's tertiary structure, amino acids at specific sites can be changed to produce high value proteins such as increased activity and increased heat resistance. We can quickly produce a variety of mutant genes to make proteins designed for this purpose. Collaboration with people who have new ideas for improving protein performance is always open.

▪ Antibody Gene Production

The expression efficiency can be improved by optimizing the codon to the host to express when producing antibodies for various disease diagnosis. In addition, various types of antibody libraries can be easily obtained to maximize diversity for obtaining high titer antibodies.

▪ Development of useful substance producing organism

The efficiency of production can be improved by optimizing genes related to the production of useful substances of strains producing various industrial useful materials.

▪ Gene Construction

When you want to obtain a hypothetical gene or sequence that does not exist in the biological system, you can get the DNA you want through gene synthesis, so you can quickly study the infinite protein universe.

Gene Synthesis Service

Ordering Information

Gene Synthesis Service		
Synthesis Period	1~1,200 bp	(guarantee) 12 working days
	1,201~2,000 bp	(guarantee) 17 working days
	2,001~3,000 bp	(guarantee) 22 working days
	3,001 bp~	Inquire
Delivery Form	2~5 µg of lyophilized plasmid (Low copy plasmid: 1~2 µg)	
Cloning Vector	Basic vector - pBHA	
	Other - Inquire	
Subcloning	If ordered with commercial or custom vector of your choice	
Additional Service	Produce high yield of plasmid DNA *Excluding Low copy plasmid	

- ✓ Additional charges will apply for gene segments containing complexities such as high or low GC content, repeat sequences or homopolymeric runs.
- ✓ If you want to use subcloning with commercial vector, your order will be continued to Gene Cloning Service.
- ✓ Synthesized genes will be sequenced. Only 100% sequence identity products will be shipped.
- ✓ Genes that produces toxic substances or inhibits growth in *E.coli* cell system will be delivered in the form of PCR products or plasmid DNA, even during the sequence check during the synthesis process.
- ✓ If the gene synthesis is ordered for the protein expression or purification, Bioneer's *ExiProgen™* service can be used to directly obtain the proteins.

Quotations and Ordering

1. Click on the 'Gene/mRNA Synthesis' banner on the Bioneer web site (www.bioneer.com).
2. Click on the desired service, fill in the entry and press 'Preview invoice' to confirm the details and quote price.
3. If you continue to order, press the 'Add to Cart' button to place the payment in the cart.

* Genes ordered before GMT +9 PM 4:00 on that day will begin synthesizing on that day.

Cancellation regulation

- 50% charge of service bill for cancellation in 5 days.
- 80% charge of service bill for cancellation after 5 days.
- Free of charge for cancellation after guarantee duration (Guarantee duration: gene synthesis period except delivery).

Technical Support

- Tel: +82-42-930-8793, 8515 (Synthetic Biology team)
- E-mail: geneorder@bioneer.com
- Time: GMT +9 AM. 9:00 - PM. 6:00 (Monday - Friday)

Rapid Gene Synthesis Service

Service Description

Meet our current Gene Synthesis Service faster.

Based on the gene synthesis technology that has been built up over the years, this service is designed to allow you to receive and use the synthesized gene more quickly.

Get faster and more convenient access to the high-quality Gene Synthesis Service.

Rapid Gene Synthesis Service VS Gene Synthesis Service

Gene length	Synthesis Period
Rapid Gene Synthesis Service	
1~500 bp	5 working days
501~1,500 bp	8 working days
Gene Synthesis Service	
1~1,200 bp	(guarantee) 12 working days
1,201~2,000 bp	(guarantee) 17 working days
2,001~3,000 bp	(guarantee) 22 working days
3,001 bp~	Inquire

Ordering Information

Rapid Gene Synthesis Service		
Synthesis Period	1~500 bp	5 working days
	501~1,500 bp	8 working days
Delivery Form	2~5 µg of lyophilized plasmid	
Cloning Vector	pBHA (Basic vector)	
Additional Service	Produce high yield of plasmid DNA	

- ✓ Synthesis containing complex structures such as high or low GC, repeated sequences, homo-polymeric runs, etc. may be limited. (General Gene Synthesis service available)
- ✓ Genes synthesis that inhibit growth or contain toxicity to *E. coli* cell system may be limited. (General Gene Synthesis service available), We do not guarantee the synthesis period if confirmed during synthesis.
- ✓ If the synthesis is completed after the guarantee period, 40% of discount will be applied to the estimated price.

Quotations and Ordering

1. Click on the 'Gene/mRNA Synthesis' banner on the Bioneer web site (www.bioneer.com).
2. Click on the desired service, fill in the entry and press 'Preview invoice' to confirm the details and quote price.
3. If you continue to order, press the 'Add to Cart' button to place the payment in the cart.

* Genes ordered before GMT +9 PM 4:00 on that day will begin synthesizing on that day.

Cancellation regulation

- Order cancellation is not possible due to service characteristics.

AccuGeneBlock Service

○ Service Description

AccuGeneBlock Service provides synthesis of double strand DNA fragments (less than 1 kb) in as little as 3 days. It is a brand new service offered by Bioneer, a leader in Gene Synthesis. AccuGeneBlock Service provides you with your gene fragments at a great price with fast turnaround time so you can use it easily and quickly in synthetic biology research.

○ Features and Benefits

▪ Economical Price

Low price due to self-production of genetic raw materials.

▪ Accurate and Fast Synthesis

Fully Automatic Synthesis makes it possible to synthesize high-quality genes in as little as 3 days.

▪ Easy Protein Synthesis

Gene fragments can be used for protein synthesis with PCR templates using *ExiProgen*[™]

▪ Synthesis of Large Genes

You may combine multiple AccuGeneBlocks in order to synthesize large genes through cloning.

▪ Codon Optimization

Complimentary codon optimization on request to enhance protein expression and functionality.

○ Applications

▪ Synthesis of large genes

It is possible to make the larger genes by combining multiple AccuGeneBlocks through cloning, Gene Assembly methods, etc. using the double strand DNA provided.

▪ Improve protein productivity

By optimizing codons for each expression host such as *E. coli* and animal cell lines, it is possible to increase the efficiency of protein expression as much as possible to increase the productivity of various proteins such as biosimilars and enzymes more than twice.

▪ Antibody Gene Production

The expression efficiency can be improved by optimizing the codon to the host to express when producing antibodies for various disease diagnosis. In addition, various types of antibody libraries can be easily obtained to maximize diversity for obtaining high titer antibodies.

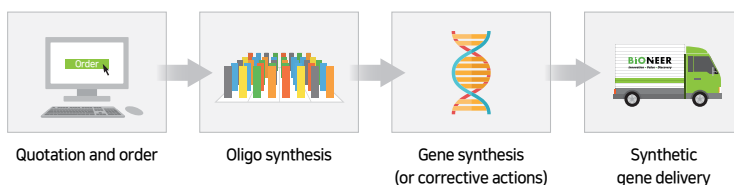
▪ Development of useful substance producing organism

The efficiency of production can be improved by optimizing genes related to the production of useful substances of strains producing various industrial useful materials.

▪ Gene Construction

When you want to obtain a hypothetical gene or sequence that does not exist in the biological system, you can get the DNA you want through gene synthesis, so you can quickly explore the infinite protein universe.

○ Procedure



AccuGeneBlock Service

○ Ordering Information

AccuGeneBlock Service		
Service Period	< 500 bp	Average 3~5 working days
	501~1,000 bp	Average 4~6 working days
Delivery Form	500 ng~1 µg of lyophilized PCR product	
Additional Service	Increased Quantity	

- ✓ Synthesis may be limited if the gene contains high or low GCs, repeat sequences, or homo-polymeric runs. (Please use Gene synthesis service)
- ✓ Only 1Kb or less genes can be synthesized.
- ✓ All the products are shipped after a thorough sequence check.

■ Quotation and Ordering

1. Click on the 'Gene/mRNA Synthesis' banner on the Bioneer web site (www.bioneer.com).
2. Click on the desired service, fill in the entry and press 'Preview invoice' to confirm the details and quote price.
3. If you continue to order, press the 'Add to Cart' button to place the payment in the cart.

* Genes ordered before GMT +9 PM 4:00 on that day will begin synthesizing on that day.

■ Cancellation regulation

- Order cancellation is not possible due to service characteristics.

■ Technical Support

- Tel: +82-42-930-8793, 8515 (Synthetic Biology team)
- E-mail: geneorder@bioneer.com
- Time: GMT +9 AM. 9:00 - PM. 6:00 (Monday - Friday)

Gene Cloning Service

Service Description

With Bioneer's long experience and rich molecular biology technology, this service solves troublesome and time-consuming cloning and sequence verification processes at once.

Features and Benefits

Fast and economical service

Fast and inexpensive service by building a batch production system from genetic raw materials to ultra-fast oligo synthesizers.

Accurate quality

Guaranteed 100% sequence using Automatic DNA sequencer (ABI 3730)

Selection of various vectors

Various vector can be selected according to the application at low price.

Applications

Improve protein function

Cloning with the desired vector can increase the efficiency of protein expression.

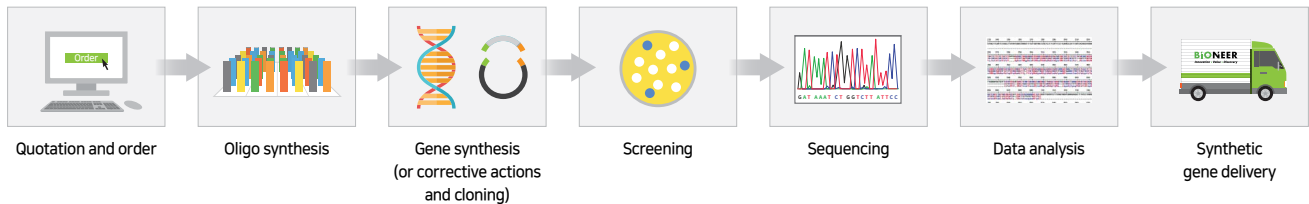
Antibody Gene Production

The expression efficiency can be improved by optimizing the codon to the host to express when producing antibodies for various disease diagnosis. In addition, various types of antibody libraries can be easily obtained to maximize diversity for obtaining high titer antibodies.

Development of useful substance producing organism

The efficiency of production can be improved by optimizing genes related to the production of useful substances of strains producing various industrial useful materials.

Procedure



Ordering Information

Gene Cloning Service		
Sample Type	Plasmid DNA	≥10 μl, 150~200 ng/μl
	PCR product	≥10 μl, 50 ng/μl
Service Period	1~8 kb (vector+insert)	Average 5~10 working days
	8~11 kb (vector+insert)	Average 10~15 working days
	11 kb~ (vector+insert)	Inquire
Additional Service	Produce high yield of plasmid DNA * Excluding low copy plasmid service	
	<i>E.coli</i> cell stock supply service	
	Proceed with Gene Synthesis Service	

- ✓ Price & period can be increased based on the structure, quality of gene.
- ✓ If customer requests to purchase the commercial vector by Bioneer, vector purchasing cost will be charged separately.
- ✓ If customer sends the wrong sample, 50% of total amount will be charged. So please make sure to send us as checking completely by your side.
- ✓ If customer cancels the order during process, 50% of total amount will be charged.
- ✓ If customer requests to hold the cloning service due to personal reason, we can hold 1 month at the maximum. After 1 month, order will be canceled automatically & 50% of total amount will be charged.

Gene Cloning Service

■ Quotation and Ordering

1. Click on the 'Gene/mRNA Synthesis' banner on the Bioneer web site (www.bioneer.com).
2. Click on the desired service, fill in the entry and press 'Preview invoice' to confirm the details and quote price.
3. If you continue to order, press the 'Add to Cart' button to place the payment in the cart.

* Mutagenesis / Gene Cloning Service starts from the time the material is received.

■ How to send Template DNA

Write the agency and client name clearly on the box. Then send your samples to the following address.

8-11, Munpyeongseo-ro, Daedeok-gu, Daejeon 34302, Republic of Korea BIONEER CO. Synthetic Biology Team (Tel: +82-42-930-8793, 8515)

■ Technical Support

- Tel: +82-42-930-8793, 8515 (Synthetic Biology team)
- E-mail: geneorder@bioneer.com
- Time: GMT +9 AM. 9:00 - PM. 6:00 (Monday - Friday)

Mutagenesis/Codon Library Mutagenesis Service

○ Mutagenesis Service Description

Mutagenesis service provides mutant gene synthesis essential for researches based on not only protein structure and functions, but also improvements on enzymatic functions easily through Bioneer's gene synthesis service.

○ Codon Library Mutagenesis Service Description

With the Codon Library Mutagenesis Service, we provide gene library by codon-based mutagenesis in response to codon bias of a species of your interest. You simply select the species where your genes will be expressed and specify the location of codon(s) in the gene sequence along with amino acid name(s) that each codon will designate. Bioneer's service team conducts codon mutation according to the codon usage in the species of your interest.

○ Features and Benefits

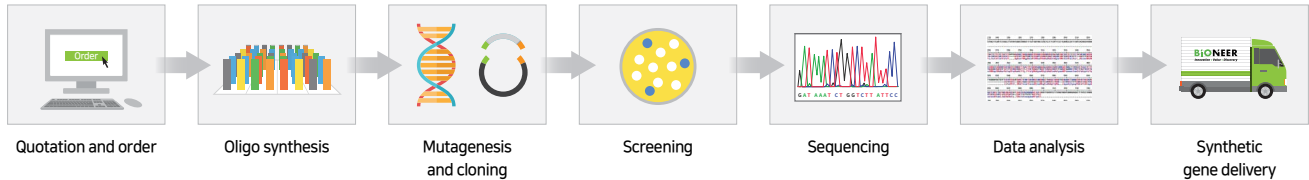
▪ Fast and economical service

Fast and inexpensive service by building a batch production system from genetic raw materials to ultra-fast oligo synthesizers.

▪ Accurate quality

Guaranteed 100% sequence using Automatic DNA sequencer (ABI 3730)

○ Procedure



○ Ordering Information

Mutagenesis Service		
Accepted materials	Plasmid DNA	≥10 μl, 150~200 ng/μl
Service period	~1 kb	Average 5~10 working days
	1~3 kb	Average 10~15 working days
	3~5 kb	Average 15~25 working days
	5 kb~	Inquire
Additional service	Produce high yield of plasmid DNA	
	Proceed with Gene Synthesis Service	

- ✓ The price and duration can increase depending on the structure and characteristics of the gene.
- ✓ Sending the wrong sample will charge a fee of 50% of the total cost, so please check before the packaging.

○ Applications

▪ Improve protein function

Based on the protein's tertiary structure, amino acids at specific sites can be changed to produce high value proteins such as increased activity and increased heat resistance. We can quickly produce a variety of mutant genes to make proteins designed for this purpose. Collaboration with people who have new ideas for improving protein performance is always open.

▪ Antibody Gene Production

The expression efficiency can be improved by optimizing the codon to the host to express when producing antibodies for various disease diagnosis. In addition, various types of antibody libraries can be easily obtained to maximize diversity for obtaining high titer antibodies.

▪ Development of useful substance producing organism

The efficiency of production can be improved by optimizing genes related to the production of useful substances of strains producing various industrial useful materials.

Mutagenesis/Codon Library Mutagenesis Service

Codon Library Mutagenesis Service		
Accepted materials	Plasmid DNA	≥10 µl, 150~200 ng/µl
Service period	~1 kb	Average 5~10 working days
	1~3 kb	Average 10~15 working days
	3~5 kb	Average 15~25 working days
	5 kb~	Inquire
Additional service	Produce high yield of plasmid DNA	
	Proceed with Gene Synthesis Service	

- ✓ Mutation site units: maximum 7 sequential codons. (DNA: maximum 21 bp).
- ✓ The price and duration may increase depending on the ordered structure and characteristics of the gene.
- ✓ Sending the wrong sample will charge a fee of 50% of the total cost, so please check before the packaging.

■ Quotation and Ordering

1. Click on the 'Gene/mRNA Synthesis' banner on the Bioneer web site (www.bioneer.com).
2. Click on the desired service, fill in the entry and press 'Preview invoice' to confirm the details and quote price.
3. If you continue to order, press the 'Add to Cart' button to place the payment in the cart.

* Mutagenesis / Gene Cloning Service starts from the time the material is received.

■ How to send Template DNA

Write the agency and client name clearly on the box. Then send your samples to the following address

8-11, Munpyeongseo-ro, Daedeok-gu, Daejeon 34302, Republic of Korea BIONEER CO. Synthetic Biology Team (Tel: +82-42-930-8793, 8515)

■ Cancellation regulation

- If canceled within 5 days after order, 50% of the price will be charged.
- If canceled up to 5 days after order, 80% of the price will be charged.

■ Technical Support

- Tel: +82-42-930-8793, 8515 (Synthetic Biology team)
- E-mail: geneorder@bioneer.com
- Time: GMT +9 AM. 9:00 - PM. 6:00 (Monday - Friday)

Vector Information

When using Bioneer's Gene Synthesis Service & Cloning Service, customers can select a vector according to their purpose, which makes them easy to get appropriate plasmid without paying for commercial vector purchase.

Please refer to below vector information customers can select:

- ✓ High copy vector - pBHA, pBHK, pBHC & pBHZ
- ✓ Low copy vector - pBLA, pBLK, pBLC & pBLZ
- ✓ *In vitro* transcription vector - pBIC-A
- ✓ Expression vector - pBT7-N-His, pBT7-C-His, pBT7-N-GST & pBT7-C-GST

With the expression vector, customers can check protein expression & purification more easily by using Bioneer's *ExiProgen*[™] fully automated protein synthesis and purification system or *AccuRapid*[™] manual type kit.

Vector Group	Vector Name	Feature and Antibiotics Marker
High Copy Vector	pBHA	pUC Origin, Ampicillin
	pBHK	pUC Origin, Kanamycin
	pBHC	pUC Origin, Chloramphenicol
	pBHZ	pUC Origin, Zeocin
Low Copy Vector	pBLA	P15A Origin, Ampicillin
	pBLK	P15A Origin, Kanamycin
	pBLC	P15A Origin, Chloramphenicol
	pBLZ	P15A Origin, Zeocin
<i>In-vitro</i> Transcription Vector	pBIC-A	T7 & SP6 Promoter, Ampicillin
Expression Vector	pBT7-N-His	T7 Promoter, N-terminal His-tag, Ampicillin
	pBT7-C-His	T7 Promoter, C-terminal His-tag, Ampicillin
	pBT7-N-GST	T7 Promoter, N-terminal GST-tag, Ampicillin
	pBT7-C-GST	T7 Promoter, C-terminal GST-tag, Ampicillin

Gene Synthesis FAQs

Gene Synthesis Service

1. How do I use Gene Synthesis Service?

- 1) Open Bioneer homepage(www.bioneer.com) and click on Gene Synthesis Service Page.
- 2) Log in.
- 3) Enter the necessary information and confirm the quotation.
- 4) Click Add to Cart button; then place your final order.

Synthesis will start on the same day if the orders are placed before 16:00. Otherwise, it will start on the next day. This service is unavailable during the holiday period.

2. What is the maximum length for the gene synthesis?

There is no limit in length. However, genes that go over 3 kb will take a long time. Those orders will be require consultation. Not that as gene synthesis of vector construction is done differently from the normal synthesis, its price and the duration time will also not be same.

3. How is the synthesized gene provided?

Ordered genes are provided in the form of 2 to 5 µg lyophilized plasmid DNA cloned in the basic vector.

4. What is the duration of the Gene Synthesis Service?

Please refer to the table below to see the price of gene synthesis having simple sequences.

The cost and delivery time will be extended for genes with structures complicated for synthesis such as having a high GC content ratio, or tandem repeat, inverted repeat, or homo-polymeric sequence.

Furthermore, synthesis of genes inhibiting growth or having toxicity to *E. coli* will increase the service price (by 20%) and time. The extended period is unable to be estimated.

Gene Synthesis Service		
Synthesis Period	1~1,200 bp	(guarantee) 12 working days
	1,200~2,000 bp	(guarantee) 17 working days
	2,001~3,000 bp	(guarantee) 22 working days
	3,001 bp~	Inquire

For the No guarantee gene, the synthesis period is not guaranteed, and the synthesis period shown in the quotation is the average synthesis period.

5. Why does ordering a gene with high GC composition, repeats, or homo-polymeric sequence increases the service cost and duration time?

This service synthesizes oligonucleotides and utilizes staggered hybridization, ligation, and PCR reactions for gene synthesis. Having repetitive sequences makes the hybridization processes difficult, increasing the difficulty to the synthesis.

In this case, additional oligonucleotide designs are required with further synthesis and tests. Thus, additional fees will cost, greatly varying on the length and type of the repeat sequence.

6. Is there a service for cloning my genes to a specific vector?

Yes, it can be done through a separate cloning service. While ordering this service, select "Gene synthesis & Cloning" and specify the what you need (such as providing vector samples to us, enzyme sites, etc.). After checking the price, you can finalize your orders.

Furthermore, we offer 50% discount if the cloning service is ordered with the gene synthesis service.

AccuGeneBlock Service

1. What kind of genes are possible to order with AccuGeneBlock synthesis service?

This service is only capable of synthesizing linear double-stranded DNA with a length of 1 kb or less without high GC contents or any tandem repeats, inverted repeats, or homo-polymeric sequences. If your genes have features that inhibit the synthesis such as high & low GC, repeats, or inverted sequences, please use Gene Synthesis service.

2. What should I do if AccuGeneBlock is unavailable?

Please use the gene synthesis service instead if you cannot please the order because of the above reason.

Codon optimization

1. Can I request for codon optimization?

Yes, you can use the codon optimization site on the homepage to not only check the best codons, but also modify your codons directly.

2. What kind of codon optimizers do you use?

We use a codon optimization program developed together with Bioneer and KAIST.

Risk Sequence

1. What is a risk sequence?

We categorize those containing Select Agents and Toxin sequences described in the Harmonized Screening Protocol of the International Gene synthesis Consortium (IGSC) as "Risk sequences."

2. Is it possible to synthesize the risk sequences?

Yes you may. However, we only provide risk sequences to bona fide research agents with meticulous screening. Buyers must sign a written consent form to indicate that they agree to use our Risk sequences only for research purposes.

Gene Synthesis FAQs

Mutagenesis & Gene Cloning Service

1. How should I send my samples?

Please send us at least 150-200 ng/μl, vol.10 μl. of template DNA. Receiving the wrong sample will charge 50% of the total price. Please check again before the packaging.

Fill out the name of your agency and client on the box and send the sample to the following address.

8-11, Munpyeongseo-ro, Daedeok-gu, Daejeon 34302, Republic of Korea BIONEER CO. Synthetic Biology Team (Tel: +82-42-930-8793, 8515).

2. How long will the service take?

We cannot guarantee the specific dates for the finalization as genes some may not be compatible with mutagenesis or cloning due to their characteristics. On average, it takes about 1 ~ 2 weeks. If both services are ordered together, it will take two to three weeks on average.

Ordering and others

1. How do I place an order?

All services are available online on our website.

After selecting the desired services and writing the required information, you may check the quotation to finalize your orders. Order will be confirmed once your payment is complete.

2. Is there a discount for a mass order?

We do have a policy for a mass synthesis order. Please contact us separately.

3. How much does it cost to change the sequence or cancel during the synthesis process?

If you want to change the sequence:

Order cancellation period	Cancel Price
Within 5 days after ordering	50% of the total price
After 5 days of ordering	80% of the total price
After guarantee period (Guarantee period: Date for finalized synthesis except for delivery time)	free

4. Is directional cloning possible? How about more plasmids?

Yes, both are possible. However, while we offer directional cloning service for free, a fee of \$100 will be charged per additional 100 μg of vector, requiring five more days for completion.

5. How do I use the finished product?

Add 20 μl (Final 250 ng/μl) of DW or TE buffer to the delivered DNA. (It is recommended to add DW or TE buffer to tubes and store at 4°C for 10 minutes.)

For the long-term storage, refrigerate it at -20°C. However, you can store at the room temperature if the DNA is in dried state.

6. How are finished products stored and how long does it take to store information and products?

We safely store your ordered genetic information along with the finished products for six months. Contact us to immediately discard them after the synthesis.

Synthetic gene manual

✓ Use in when you want to increase

1. Add 20 μ l of DW or TE buffer into delivered DNA (Final 100 - 250 ng/ μ l).
2. Prepare competent cell. (Commercial competent *E. coli* or self-made competent *E. coli* - DH5 α strain is recommended)
3. Carefully transfer 1 μ l of plasmid DNA into the tube prepared in step 2.
4. Place the tube on ice for 20 minutes.
5. Heat-shock the cells for 60~90 seconds in a water bath at exactly 42°C.
6. Immediately place the competent cell+DNA mixture back to ice for 3 minutes.
7. Put the mixture into 10 ml of LB + Ampicillin (50 μ g/ml - 100 μ g/ml) culture medium.
8. Incubate for overnight at 37°C with shaking (200 rpm, about 16 hr) and isolate plasmid DNA using *Accuprep*[®] Plasmid extraction kit.
9. Restriction enzyme cut or PCR depending on the purpose and use after quantitative measurement of DNA.

- Delivery form is lyophilized plasmid DNA cloned in vector (Can be stored at room temperature).
- After dissolving DNA in D.W. or TE buffer, it is recommended that place DNA at 4°C for 10 minutes.
- Store at -20°C after adding D.W. or TE buffer.

✓ Use it when you want to experiment

1. Add 20 μ l of D.W. or TE buffer into delivered DNA (Final 100~250 ng/ μ l).
2. After quantitative measurement of DNA, restriction enzyme cut or PCR depending on the purpose and use immediately.

02. mRNA Synthesis

mRNA Synthesis Service	239
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mRNA Synthesis Service

○ Service Description

Our mRNA Synthesis Service provides mRNA through *in vitro* transcription. By sending us the DNA plasmid or the gene sequence, we can synthesize a high-quality mRNA depending on the customers' experimental purposes.

For instance, for those aiming for protein expression, we have an option to apply 5' capping and 3' poly (A) tailing to increase the translation efficiency.

Furthermore, for those wanting to undergo translation process through our synthesized mRNA, not only we provide 5' cap and 3' poly (A) service, but also provide 5' or 3' UTR (Kozak sequence) for

an improved translation efficiency. For those studying the effect of ncRNA (non-coding RNA), we can synthesize ORF without any modifications.

At least 50 µg of the synthesized mRNA is dissolved in DEPC treated DW and packaged in dry ice for shipping. Quality data is also included for a reference.

○ Features and Benefits

- Guaranteed mRNA quantity of 50 µg for the standard mRNA synthesis service
- Flexible choice of options depending on the use of mRNA
- Suitable price with high-quality & quantity of mRNA

○ Ordering Information

mRNA Synthesis Service	
Description	For this service, customers must provide a DNA template with a T7 promoter cloned in a vector. If you wish to choose 5' cap and 3' poly (A) tail option, the mRNA will be modified after the <i>in vitro</i> transcription.
5' capping	Option available
3' tailing	
Service Period	5~10 working days
Guaranteed yield	50 µg

Complete Synthesis Service	
Description	For this service, customers only need to provide the DNA sequence. As the final mRNA is provided with 5' kozak sequence, 3' UTR and 3' poly (A) tail, this service is recommended for those doing studies related to protein expression after transfection. 5' capping option can be also selected if needed. This service included gene synthesis service, along with its price.
5' capping	Option available
3' tailing	Included
Service Period	13 working days~ (dependant on gene size)
Guaranteed yield	50 µg

Cloning linked mRNA Synthesis Service	
Description	This service is for customers wishing to have mRNA from any kind of DNA construct, including PCR product or DNA template in a plasmid form. The mRNA is cloned into an appropriate vector after <i>in vitro</i> transcription.
5' capping	Option available
3' tailing	Included
Service Period	10 working days~ (dependant on gene size)
Guaranteed yield	50 µg

- ✓ All the price of mRNA Synthesis Service are based on 1 reaction done through 1 µg of DNA.
- ✓ The final yield of mRNA will be reduced if the 5' cap or 3' tailing option is selected due to additional purification steps.
- ✓ If template DNA is required, please send 150~200 ng/µl, vol. 10 µl or more samples in the form of plasmid DNA or 50 ng/µl, vol. 10 µl or more in the form of purified PCR products.
- ✓ Sending the wrong sample will charge a fee of 50% of the total cost, so please check before the packaging.
- ✓ Canceling the order will charge 50% of total cost.

▪ How to send Template DNA

Write the agency and client name clearly on the box. Then send your samples to the following address

8-11, Munpyeongseo-ro, Daedeok-gu, Daejeon 34302, Republic of Korea BIONEER CO. Synthetic Biology Team (Tel: +82-42-930-8793, 8515)

▪ Technical Support

- Tel: +82-42-930-8752 (Synthetic Biology team)
- E-mail: geneorder@bioneer.com
- Time: GMT +9 AM. 9:00 - PM. 6:00 (Monday - Friday)