

# TECHNICAL WRITER CERTIFICATION CAPSTONE PROJECT

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# ***Grant Proposal: HPLC System*** **Research Funding Request**

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*Med Labs Atl* is a diagnostic laboratory serving patients in the Atlanta area for the past five years. We work with doctors who seek our expertise in disease diagnosis. Our disease detection methods are primarily through analysis of blood.

An HPLC system detects *catecholamines*, or neurotransmitters and hormones in the body, to diagnose Parkinson's, muscular dystrophy, and heart disease with more precision than alternative methods. HPLC, or high performance liquid chromatography, is defined by [Thermo Fisher Scientific](#) as:

*A broad analytical chemistry technique used to separate compounds in a chemical mixture.*

## **Problem Statement**

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The available analytical devices at *Med Labs Atl* are inconsistent and cost our team hours of valuable time. Our profit dropped following the device inconsistencies and forced us to undergo a complete shutdown of all diagnostic services, leaving patients waiting an average of three weeks for results. We are unable to independently replace our devices and pay our employees for the two weeks due to our profit loss. Without prompt recovery from this issue, we will be forced to send our customers elsewhere as their experience with our services in the past month is unacceptable.

## **Proposal Statement**

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Despite the recent issues at *Med Labs Atl*, profits in the past three years have steadily improved. Last year, we created an online portal showing estimated wait times and results when available. Our goal is to bring our performance to the standard we kept for the past few years for our patients' satisfaction. We hope to reach our goal with the assistance of the 2024 Small Business Grant so that we can continue to make a difference in the diagnostic process for our patients.

## Cost and Benefits Summary

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The 2024 Small Business Grant offers 30,000 USD to qualifying businesses, and the price of a new low-end HPLC system from [LabX](#) is 20,000 USD. Therefore, the grant will cover the full price of the required equipment, the payment due to our employees, and allow us to continue to serve our customers with improved tools and efficiency. From calculations based on our current methods, the HPLC system will save our patients at least one week of waiting time from sample acquisition to result release. This time is vital for further testing and reduced anxiety during the waiting period, and will give our patients the peace of mind they deserve. Patients will also have access to an improved portal with the remainder of the funds to enhance their experience and reduce the app crashing experienced by some users.

## Budget

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The *Budget* details how we will allocate the funds from the 2024 Small Business Grant. The *Items* are separated into *Categories* of either Deposit or Expense. The HPLC Staff Training and Employee Pay (Past 2 Weeks) expenses are approximated based on referenced data and pay averages respectively. The *Total* values are the averages per person multiplied by the number of people (5 staff members), or simply the restated *Quantity* values (in USD).

<i>Category</i>	<i>Item</i>	<i>Quantity (USD)</i>	<i>Total</i>
Deposit	2024 Small Business Grant	30000	30000
Expense	HPLC System	20000	20000
Expense	HPLC Staff Training	200/person	1000
Expense	Employee Pay (Past 2 Weeks)	1600/person	8000
Expense	Improved Portal Software	1000	1000

## Timeline

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The *Timeline* details our implementation plan for the features discussed in the *Budget* section.

<i>Step</i>	<i>Expected Date</i>
Proposal accepted	3/22
Funds transferred	3/29
Pay Employees	3/30
Order HPLC System	4/1
HPLC System Arrives	4/15
HPLC Staff Training	4/18
Improve Portal	4/23

## Conclusion

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The HPLC system purchased with the 2024 Small Business Grant would revolutionize our methods and business, allowing us to expand and experiment with better testing procedures. The new testing procedures will lead to more accurate and prompt diagnoses, reducing the stress of our clients and their families as they navigate their future.

# Science Writing: Using the Science of Light to Promote Sustainability

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Using photonics, or the study of light, to promote sustainability in product design and creation leads to less energy usage and pollution, greater energy production, and options to color products without dye. In addition to environmental effects, using photonics also creates more jobs, leading to economic growth while taking care of the planet. As sustainability becomes more common in society, more companies will follow the trend of profit, but currently some sustainable goals are not attainable with the available funds and technology.

## *Introduction*

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*Sustainability* can be thought of as a roadmap to preserve the world for future generations. Sustainable goals include reducing pollution and finding ways to make products using less energy. *Sustainable development* is a related concept that deals with the social, economic, and environmental aspects of sustainability, taking into consideration the need for profit to make a sustainable future possible.

*Photonics* is the science of light and how it can be used in technology; named after the particles or "*photons*" that make up visible light. Photonics can promote sustainability by using materials that reduce the impact on the environment and allowing for more effective processes to make materials. Examples of technology powered by photonics includes phone screens and lasers.

*Structural color* describes the color of some creatures, such as butterflies, in the absence of dye. The color appears when light interacts with the structure.

## *Body*

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Creating products using lasers is an application of photonics. Compared with other methods, lasers allow for lower energy usage when making vehicles, and their precision results in less waste when used for welding.

Lasers can also be used with lighter metals than traditional steel and chemical compounds which allow for more possibilities of design than classic methods. Some 3D printers use lasers to make structures with structural color, which is a more sustainable option than dye. Once the connection between the structure size and color emitted is discovered, dye will not be necessary.

Unfortunately, companies tend to make decisions based on profit instead of considering the future of the planet. For example, phones and televisions are more efficient and larger with every release, which leads to the devices consuming the same amount or more power than the previous edition. A more sustainable option involves keeping the size of the device the same and continuing to increase the efficiency which would lower the power consumption of the device. Since customers desire larger and more efficient devices over low power consumption, companies continue to meet the customers' desires instead of lowering the power consumption of the devices with each release.

At present, releasing a sustainable product is often not worth the expense (as detailed by [Berit Wessler and Ursula Tober](#)):

The initial investments in these new technologies are often higher compared to established products. Therefore eco-efficient products and technologies may not provide payback on investment until the mid- to long-term.

As the number of sustainable methods and products continues to grow, the expense will decrease to allow for profit. Until that time, the process can be sped up by government incentives for companies investing in sustainable practices, giving these companies an early start compared to their competition.

## ***Conclusion***

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As companies discover the benefits of using photonics in product design and manufacturing, they will make products with increased material capabilities and less need for harmful chemicals, dyes, and heavy metals. The change in materials is one step towards sustainability, and will propel

the economy to adapt to a more sustainable approach to keep up with the new demand.

# Competitive Analysis: Job Sites

This competitive analysis compares popular job sites based on features, price, differentiators, strengths, and weaknesses.

	Indeed	LinkedIn	ZipRecruiter
<b>Features</b>	Job Search	Job Search and Networking	Job Search
<b>Price</b>	Free	Free with Optional Paid Membership	Free
<b>Differentiators</b>	Indicators of date posted and skills necessary for jobs	Indicator of date posted for jobs, professional social media outlet	Indication of job match to uploaded resume
<b>Strengths</b>	Intuitive layout, easy applying option for some jobs, job details clearly visible	Intuitive layout, easy applying option for some jobs, pay and benefits visible	Easy applying option for some jobs
<b>Weaknesses</b>	Poor job matches based on resume, multiple listings for the same position	Integration with social media can be confusing, multiple listings for the same position	Some poor matches from search function, incorrect job matches

# FAQ: 2024 Small Business Grant

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## Eligibility and Requirements

*1. What qualifies as a small business?*

Any business with fewer than 10 employees is considered a small business for the purposes of this grant.

*2. Is a minimum credit score indicated?*

There is no minimum credit score as of 2024 for the Small Business Grant.

*3. Is the loan offered to start-ups?*

No. A business is eligible for the grant after 1 year of function.

*4. Does the grant eligibility depend on a minimum profit over a designated period?*

Yes. To be eligible for the grant, a business must have a minimum average revenue (over the past year) of \$3,000 per month.

*5. If a business does not meet the qualifications, will it still be considered?*

Yes. In some cases, such as a global pandemic or other situations outside of the business owner's control, exceptions can be made, and the business may still be considered.

*6. What qualifies as a situation outside of the business owner's control such that qualifications for the grant could be waived?*

Situations outside of the business owner's control refer to an environment in which outside factors have rendered the business unviable unless economically supported by an external entity.

## Application Process

*1. Is it free to make an application?*

Yes. No costs will be incurred throughout the application process.

*2. How do I apply?*

The online portal allows for a convenient application process.

*3. What do I need to apply?*

To apply for the Small Business Grant, you must prepare proof of revenue and function for the past year as well as a proposal detailing the purpose of your application.

4. *How long is the average waiting period after applying?*

Response times range from 1 to 4 weeks.

# User Experience Journey Map: Buying a New Computer

This user experience journey map illustrates the process of buying a new computer from discovery to advocacy. The customer represented in this map recently accepted a position at a software company and requires a computer with a high level of processing power.

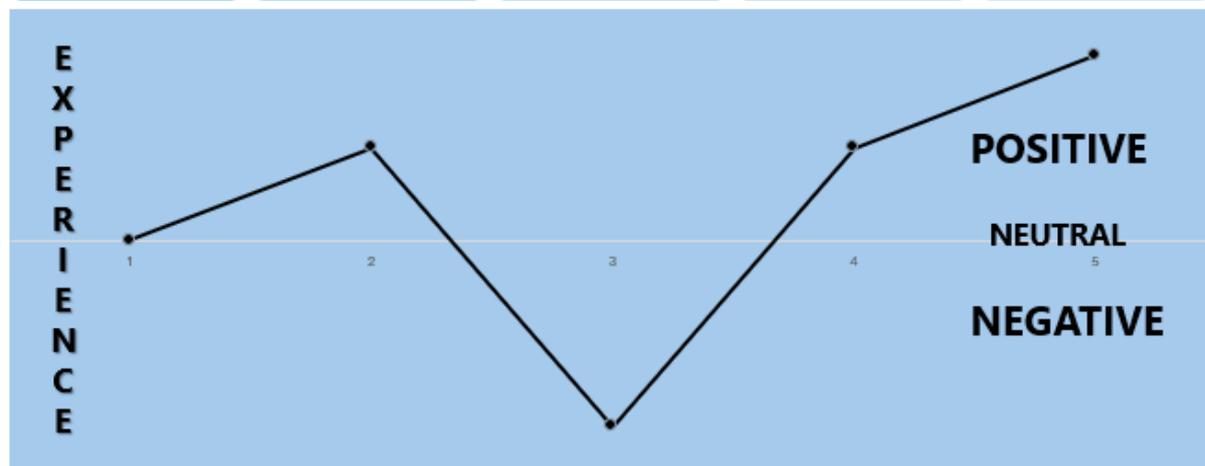
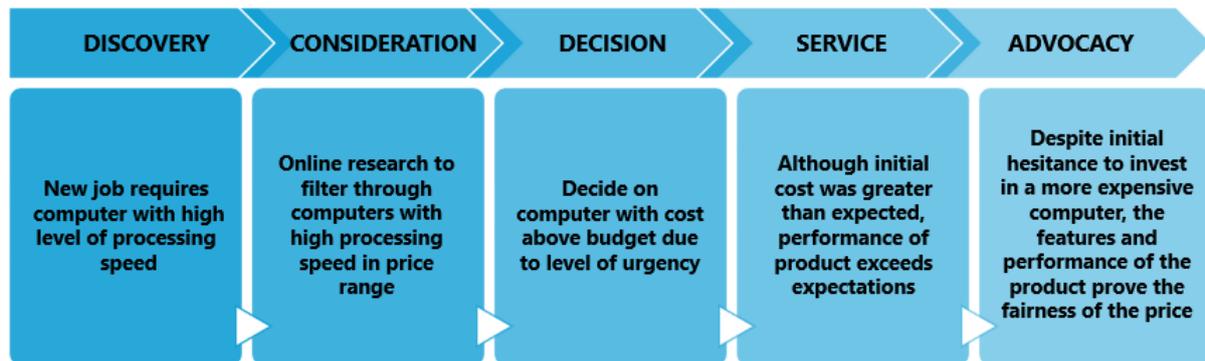


**JENNIFER WOOD**

**Occupation: Software Designer**

**Needs: Computer with high processing power**

**Issues: Has a budget which does not allow for an adequate computer**



**Experience Summary:** Despite the customer's desire to stay within her budget, she is ultimately forced to buy a computer that is more expensive than she anticipated either due to inadequate research or optimistic budgeting. This expense decreases her experience significantly, but the superior function of the computer allows her to ultimately become an advocate despite its steep price as her experience reaches its peak.

# Tutorial: How to Make a Pie Chart in Python

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*Python* is a programming language used by developers for a variety of applications due to its simplicity. When used with the library *Matplotlib*, one can plot a pie chart using Python. In this tutorial, the app *Spyder* generated the pie chart using the listed commands.

1. Import the library *Matplotlib* (name shortened for ease of use)

```
import matplotlib.pyplot as plt
```

2. Define the pieces (*with 'name'*) of pie within square brackets

```
pieces = ['A', 'B', 'C']
```

3. Define the size (*with number*) of each piece within square brackets

```
size = [9, 29, 15]
```

4. Define the colors (*with 'letter'*) of each piece within square brackets

```
colors = ['b', 'g', 'r']
```

**Preventing Errors:** For steps 2-4, ensure that you include the same number of pieces of pie, sizes, and colors. For example, if you define 3 pieces of pie, you should also define 3 sizes and 3 colors.

5. Plot the pie using the `plt.pie()` command.

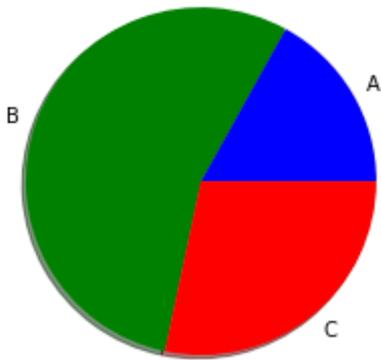
```
plt.pie(size, labels=pieces, colors=colors, shadow=True,  
radius=1)
```

*The text inside the `plt.pie()` command shown indicates the pie piece sizes, labels of the slices, colors of the slices, whether there is a shadow behind the pie, and the radius or size of the pie.*

6. To generate the pie chart, use the command `plt.show()` and run the program (*with a green arrow or button stating 'Run'*).

```
plt.show()
```

The generated plot for this case is a pie chart with pieces labeled A, B, and C:



For further reading, see [Graph Plotting in Python](#) and [How to Plot a Pie Chart in Python](#)

# Medical Writing: Patient Education on Exercise

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Starting an exercise routine is often difficult. Intimidating gym environments, overwhelming workout routines, fear of the unknown or social anxiety can discourage people from starting an exercise regimen. As with most new activities there can be a time of learning and mistakes, but as long as one keeps safety at the front of their mind, success will follow.

## Types of Exercise

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Exercise can be split into four categories:

- Strength training
- Aerobics
- Stretching
- Balance

Strength training deals with weight and includes body weight exercises. The purpose of strength training is to build muscle mass which allows for better function in everyday tasks. Examples of strength training exercises include squats, push ups, and weight lifting.

Aerobics, or *cardio*, is movement that increases your heart rate, maintains good heart condition, and encourages blood flow. Consistent movement also lowers risk of heart disease, stroke, and even depression while any amount of aerobics can improve mood.

Harvard Health Publishing [recommends](#) to:

Aim for at least 150 minutes per week of moderate-intensity activity. Try brisk walking, swimming, jogging, cycling, dancing, or classes like step aerobics.

Stretching is necessary to keep muscles flexible since they can shrink with age. Consistent stretching allows for less muscle pain and damage as well as a reduced risk of injury due to more mobility. It is important to note that stretching to the point of pain is not helpful and can cause harm. Some

stretches that do not require equipment include the child's pose and downward dog.

Balancing exercises are used to promote steadiness and prevent falls or injuries. Many balancing exercises involve standing on one foot and remaining steady. Such training also improves ability in weightlifting when balance is even more necessary to safely maneuver significant weight.

## How Do I Safely Begin?

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The combination of these four types of exercise is the best setup for success whether your goal is to get fit, feel better, or try out a new activity. It is important to speak to a personal trainer or fitness expert before attempting any potentially risky exercise activities, and to remember that all physical activity comes with an inherent risk.

If going to the gym isn't a viable option, most workouts can be performed at home. This privacy can result in less distraction and a calmer environment to learn. Even walking can improve heart health since it is a form of aerobics, and starting with something familiar can be a good transition into different types of exercises.

# References

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## ***Grant Proposal: HPLC System Research Funding Request***

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[HPLC Basics](#)

[Shop HPLC Systems Equipment, Parts and Supplies](#)

[Highly Sensitive Determination for Catecholamines Using Boronate Affinity Polymer Monolith Microextraction with In-Situ Derivatization and HPLC Fluorescence Detection](#)

[catecholamine](#)

[High Performance Liquid Chromatography \(HPLC\) Applications](#)

[HPLC Training \(Cost for Budget\)](#)

## ***Science Writing: Using the Science of Light to Promote Sustainability***

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[Green photonics: the role of photonics in sustainable product design](#)

[Structural color three-dimensional printing by shrinking photonic crystals](#)

[Sustainability](#)

[Shaping Europe's digital future](#)

[What Exactly is Optical Fiber and Why is it Used?](#)

## ***Medical Writing: Patient Education on Exercise***

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[The 4 most important types of exercise](#)

[Gymtimidation: How To Push Through Gym Anxiety](#)