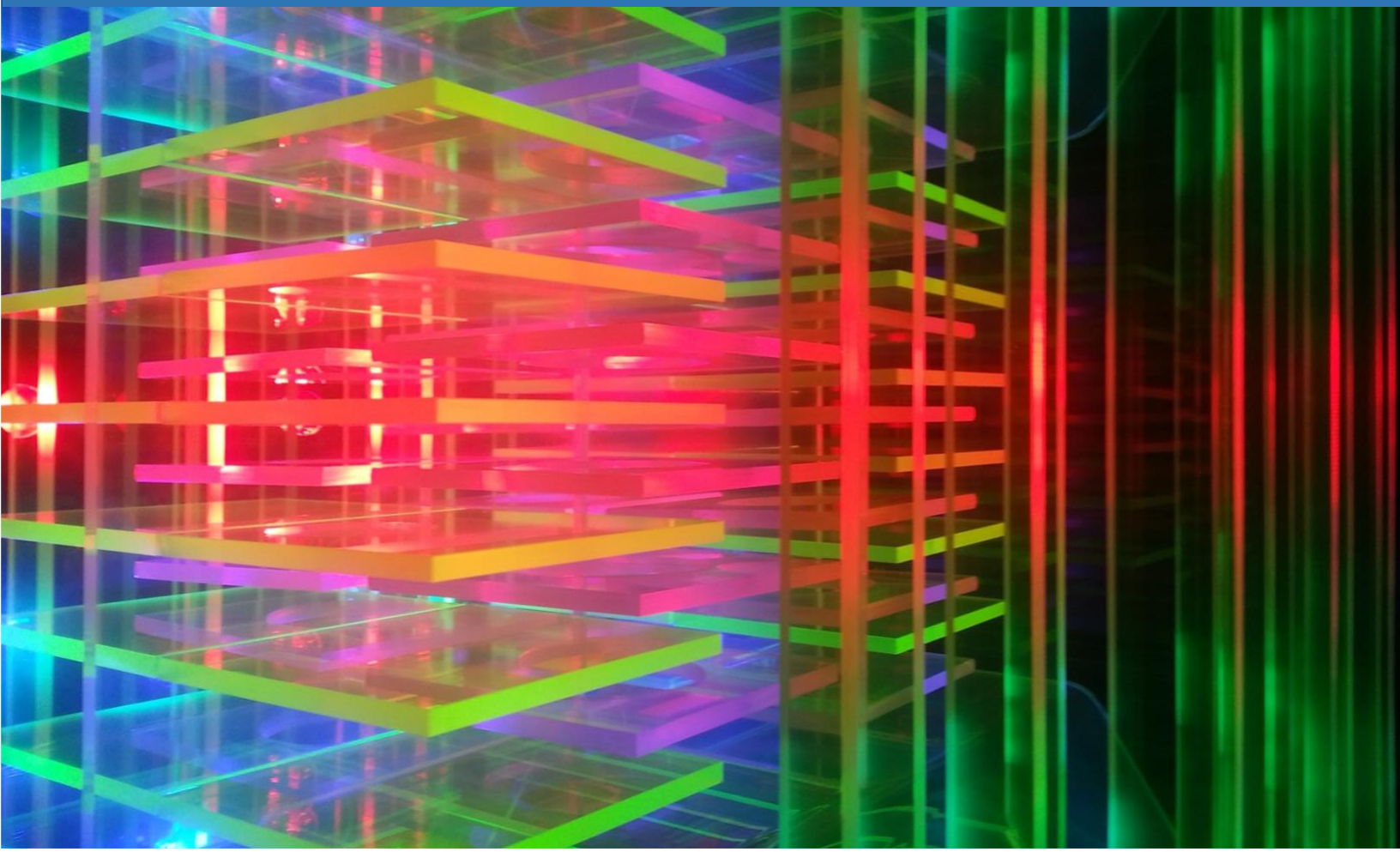
Top 60 Careers in Photonics & Optics



Florida Photonics Cluster

Orange County Florida

A GUIDE FOR EARLY CAREER PROFESSIONALS to discover promising career paths in Florida

The Top-60-Careers in Photonics Brochure was created by the Florida Photonics Cluster – with the assistance of Orange County Government in the State of Florida – to provide an overview of the opportunities awaiting those considering a career in Photonics. It is an exciting field, with opportunities to work in many areas. While this guide by no means covers all career tracks, it is meant to provide information about the principle career tracks in the optics and photonics industry. Our colleagues at Optics Professionals LLC helped in establishing many of the career titles found in this brochure.

The brochure presents a variety of career options for early career professionals interested in advancement opportunities in the optics & photonics industry. For the purpose of grouping skill sets, it is broken down into three major business areas:

Throughout the brochure, we provide a high-level description of what each job position entails, the typical levels of education and experience required, and the associated salary ranges. Salary ranges were determined using searches of online recruiting sites (primarily ZipRecruiter) and implementing the following methodology:

1. The **Low** is the salary indicated at the 10-25th percentile,
2. the **Average** is the stated average,
3. and the **High** is the salary indicated at the 75-90th percentile.

Please note that the online calculation of **average salary** is **not** a mathematical mid-point between the ranges. It is a mathematical average of all reported incomes, including the outliers in the bottom and top 10%, which were not included in our high and low ranges due to the very low numbers of people in those positions. We used this approach to arrive at the most realistic picture of real-life salaries, based on the data presented.

Keep in mind, as you start your career, your individual salary will vary depending on your education and experience, the industry, employer, and geographic location. For the purposes of this brochure, we filtered for jobs located in Florida.

The members of the Florida Photonics Cluster and Optics Professionals wish you well in your chosen career.

ENGINEERING

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Engineers, as practitioners of engineering, are professionals who invent, design, analyze, build, and test machines, complex systems, structures, gadgets, and materials to fulfill functional objectives and requirements while considering the limitations imposed by practicality, regulation, safety, and cost. Engineers are critical to the Optics and Photonics industry.

Engineering graduates are well suited to roles in management, as they often have strong problem-solving skills and the ability to 'think outside the box'. In general, engineers desire to better their world and improve on things around them. They thrive on challenges and the opportunity to design products that can benefit society. New technology trends are pushing engineers to stay current. The further development of IoT systems, electromechanics, additive manufacturing (3D printing), and robotics are now finding their way into mainstream engineering, as well as manufacturing sites and plants. As new technology emerges, engineers will be at the forefront of bringing those advancements to the masses.

Most engineering programs take four or five years to complete. Many students also receive advanced degrees, such as a Master of Science degree or a doctorate degree, as they are required for many higher-level positions. Engineers tend to earn more than the national average salary; this trend is expected to continue in the future.

Engineering degrees makeup 10 of the top 17 highest paid degrees. The average engineer is a full-time employee who works 40 to 45 hours a week and earns an average of $101,860 annually.

The following section includes some of the careers in Optics and Photonics that fall under the category of Engineering.

1. Optical Engineer

Optical Engineers use many techniques to design precision optical systems for cameras, telescopes, or lens systems. They determine the required specifications and make adjustments that calibrate and fine-tune optical devices. They also design and develop circuitry and components for devices and communication systems that use optical technology. Demand is high for **Optical Engineers** due to an increased use of optics within engineering and across applications that utilize optical technology.

Educational Requirements

Engineering / Optical Engineering

Degree	BS	MS	PhD	*
Required	■			
Preferred				*

* Internship or prior experience preferred.

Salaries

Low	Average	High
$56,180	$83,606	$121,230

2. Senior Optical Engineer

Senior Optical Engineers may also design precision optical systems for cameras, telescopes, or lens systems, but their advanced skills and/or experience opens doors for broader opportunities. **Senior Optical Engineers** lead project-based teams of engineers to develop and/or implement complex optical systems. In this role they ensure project work is completed on time and within budget, supervise team productivity, and oversee quality assurance. They may also support upper management by producing reports and may be called upon to conduct research and lead new product development.

Educational Requirements

Engineering / Optical Engineering

Degree	BS	MS	PhD	*
Required	■			*
Preferred		■		

* Prior experience as an optical engineer is required.

Salaries

Low	Average	High
$87,834	$110,035	$135,463

3. Photonics Engineer

Photonics Engineers design, integrate, or test photonics systems and components. They may also develop optical imaging components and products, signal process technologies, and/or optical systems. Most **Photonics Engineers** work for large telecommunications firms, optical fiber producers, and manufacturing plants. They often specialize in solving problems relating to the light sources used in fiber optics; knowing how to modulate light sources and control wavelength, intensity, and duration in optics systems. There are currently an estimated 132,500 photonics engineers in the U.S. with these jobs opportunities only expected to grow.

Educational Requirements

Engineering / Optical Engineering / Electrical Engineering / Mechanical Engineering

Degree	BS	MS	PhD	*
Required	■			
Preferred		■		*

* Internship or prior experience preferred.

Salaries

Low	Average	High
$56,876	$107,577	$149,333

4. Opto-Mechanical Engineer

Opto-Mechanical Engineers design and develop optomechanical systems, devices and components, such as optical mirrors and optical mounts. A mechanical engineering degree can lead the **Opto-Mechanical Engineer** into careers in many fields, including manufacturing and aerospace. These positions usually require three to six years of experience in both design and manufacturing of optical systems for consumer electronics products. Demand for **Opto-Mechanical Engineers** is high.

Educational Requirements

Mechanical Engineering

Degree	BS	MS	PhD	*
Required	■			*
Preferred		■		

* 3-6 years in design and manufacture of optical systems for consumer electronics.

Salaries

Low	Average	High
$62,938	$75,605	$92,084

5. Electro-Optical Engineer

Electro-Optical Engineers complete engineering tasks related to electronic and optical devices. They create optical designs, integrate system sensor development, and facilitate the use of laser optics. They also help verify that all engineering processes are followed correctly during design and manufacture. Personal computers skills are needed to create concepts and generate design plans and measurement specifications, and the ability to be well organized and pay close attention to detail is important. Demand for **Electro-Optical Engineers** is high.

Educational Requirements

Engineering / Industry Certifications a plus

Degree	BS	MS	PhD	*
Required	■			
Preferred				*

* In addition to the Engineering degree, industry certifications are highly desired.

Salaries

Low	Average	High
$42,535	$72,037	$110,496

6. Optical Network Engineer

The **Optical Network Engineer** is a highly skilled technology professional responsible for the planning, design, implementation or maintenance of an optical network. **Optical Network Engineers** ensure that networks operate properly in terms of the services that are carried over them – including video, data, and voice. As a network engineer, they are responsible for the foundation of an organization's IT system (and by default, the entire organization). **Optical Network Engineers** continue to be in high demand, with an estimated growth rate of 6.5 percent over the next ten years.

Educational Requirements

Engineering / Electronics

Degree	BS	MS	PhD	*
Required	■			*
Preferred				

* A diploma in the field of optics is also considered. For all paths though, a 3–5-year apprenticeship training program is often required for the specific field.

Salaries

Low	Average	High
$42,662	72,111	$101,377

7. Laser Engineer

A **Laser Engineer** is a type of electrical engineer who specializes in equipment that makes lasers, sometimes in specialty areas such as advanced optics. Job duties of a laser engineer include monitoring the laser systems, optimizing the output of the lasers, and researching issues with the performance of the lasers. They may also be required to develop documentation on how to operate and maintain the equipment, and train other technicians. **Laser Engineers** can work in a variety of fields including aerospace, alternative energy, defense, telecommunications, and the medical industry

Educational Requirements

Engineering / Photonics

Degree	BS	MS	PhD	*
Required	AA			*
Preferred				

* Entry level positions can be obtained with an AA, but those who seek senior jobs will require a BS or MS, plus experience.

Salaries

Low	Average	High
$31,257	$76,790	$117,851

8. Engineering Manager

An **Engineering Manager** is responsible for overseeing key projects. They propose project budgets, answer technical questions, and resolve any engineering issues that arise. They prepare reports on the progress of projects, and interface with other departments as needed. **Engineering Managers** must be good with people. They train new engineers and evaluate candidates on technical and interpersonal skills. Another key strength of an **Engineering Manager** is their ability to effectively delegate work and problem-solve.

Educational Requirements

Engineering / Engineering Field

Degree	BS	MS	PhD	*
Required				*
Preferred				

* Up to 5 years of experience is often required.

Salaries

Low	Average	High
$49,007	$86,435	$115,120

9. Director of Engineering

The **Director of Engineering** (sometimes referred to as the **VP of Engineering**) leads the engineering department of a company. They prepare budgets and oversee the work of multiple engineering managers, ensuring that designs meet specifications and that each department obtains what is necessary to meet milestones and deliver quality and consistency to the end users. The degree and certifications required are specific to each industry (i.e. aerospace vs. mechanical engineering). Typical career advancement for a **Director of Engineering** involves working as an engineer and then a manager before stepping into the role of director.

Educational Requirements

Engineering, with degree specific to industry

Degree	BS	MS	PhD	*
Required				*
Preferred				

* 5-10 years of engineering & management experience, plus a degree and certification(s) relevant to the industry.

Salaries

Low	Average	High
$92,085	$111,634	$141,506

10. Package Design Engineer

Package Design Engineering is an interdisciplinary field integrating science, engineering, technology, and management to protect and identify products for distribution, storage, sale, and use. It encompasses the process of design, evaluation, and production of packages. **Packaging Design Engineers** typically have offices near the packaging operations where they consult with packaging machinery technicians and other engineers. **Packaging Engineers** also work with non-technical staff such as designers and artists, as well as those in marketing and finance roles.

Educational Requirements

Packaging Engineering

Degree	BS	MS	PhD	*
Required				*
Preferred				

* Packaging Engineering or related degree

Salaries

Low	Average	High
$42,535	$76,881	$103,561

11. Product Development Engineer

A Product Development Engineer identifies company goals to conceptualize, design, and test new products. They also formulate manufacturing specifications and perform design analyses to ensure all products meet industry standards and guidelines for functionality. A successful **Product Development Engineer** should be innovative, creative, and analytical and (eventually) should have an excellent working knowledge of 3D modeling software and report-writing programs. Employers often prefer candidates to have industry-specific experience which relates to the type of products they produce.

Educational Requirements

Engineering

Degree	BS	MS	PhD	*
Required				
Preferred				*

* Industry-specific experience and AutoCAD certification are highly desirable

Salaries

Low	Average	High
$46,887	$61,603	$79,412

12. Research & Development Engineer

Research and Development (R&D) Engineers use research theories, principles, and models to perform a variety of experiments and activities to redesign existing products and create new ones. Their goal is to improve their company's current technologies and develop innovations to elevate the organization's position in their industry and market. **R&D Engineers** are employed in many industries, including manufacturing, electrical, and science-based companies; their duties vary depending on the industry, and thus tend to focus on one area of study such as software, chemical or materials engineering.

Educational Requirements

Software, Chemical, Mechanical or Materials Engineering

Degree	BS	MS	PhD	*
Required				
Preferred				*

* Experience and/or an internship as a research assistant is desirable, along with field-specific engineering experience.

Salaries

Low	Average	High
$59,640	$79,701	$101,250

13. R&D Manager / Director

Research and Development Managers / Directors perform some of the same tasks as a R&D Engineer, but take on additional management responsibilites. They oversee teams of research and development engineers, develop project plans, and manage schedules. They also provide an interface between teams of engineers and key departments to identify requirements for new products. A **R&D Manager** has advanced knowledge of research methods and in-field engineering processes required to support the company's products and will be experienced in leading teams.

Educational Requirements

Software, Chemical, Mechanical or Materials Engineering

Degree	BS	MS	PhD	*
Required	■			*
Preferred		■		

* Advanced experience in research and in-field engineering and leadership.

Salaries

Low	Average	High
$80,445	$120,668	$154,418

14. Camera Design Engineer

A **Camera Design Engineer** utilizes computer-aided design (CAD) sofrware to develop, test and inprove manufacturing processes and camera designs. They employ new and innovative simulation tools to improve optical systems performance, and analyze the optical system's influence on the image quality characteristics of the camera module. They work closely with system and product design teams to assess and improve camera integration strategy. Between 2018 and 2028, demand for **Camera Design Engineers** is expected to grow 11% and produce 7,900 job opportunities across the U.S.

Educational Requirements

Engineering, Optical Engineering, Physics

Degree	BS	MS	PhD	*
Required	■			*
Preferred		■		

* Advanced experience in research and in-field engineering and leadership.

Salaries

Low	Average	High
$52,705	$90,337	$116,507

15. Thin Film / Optical Coating Engineer

Thin Film and Optical Coating Engineers perform a variety of duties in the manufacturing of devices that rely on thin film coatings to operate. Thin films are widely used across many industries. Examples include optical lens coatings, coatings made from minerals to conduct electrical transport, and thin film used in the development of biosensors, plasmonic devices, photovoltaic cells and acoustic wave resonators. Employers may also seek Thin Film /Optical technicians to serve as front-line employees to produce and test the application of films to their products.

Educational Requirements

Physics / Mechanical Engineering

Degree	BS	MS	PhD	*
Required	■			
Preferred				

* Advanced experience in research and in-field engineering and leadership.

Salaries

Low	Average	High
$30,413	$58,736	$84,481

16. Director of Coating Engineering

The **Director of Coating Engineering** incorporates management and leadership skills to oversee coating engineering staff and production technician teams. They assess the effectiveness of current equipment, conduct research for improvements and manage new product development from inception through delivery. This includes identifying budget requirements, hiring and training personnel, and managing teams and operations. Finally, the **Director of Coating Engineering** ensure that all products meet quality standards and specifications for their clients.

Educational Requirements

Optical Engineering

Degree	BS	MS	PhD	*
Required		■		
Preferred				

* Experience managing personnel in a same or similar specialization.

Salaries

Low	Average	High
$43,922	$83,777	$104,024

17. Application Engineer

Applications Engineers work as a bridge between customers and engineering teams. They use customer input and sales information to design or re-design, develop, test and implement complex software programs and applications. **Applications Engineers** also provide technical support and expertise to customers by testing and maintaining applications and installations, responding to customer feedback, and often performing sales presentations. According to the Bureau of Labor Statistics, the field of **Applications Engineering** is expected to achieve very rapid growth of about 17 percent through 2024.

Educational Requirements

Optical Engineering, Physics

Degree	BS	MS	PhD	*
Required	■			
Preferred				

* BA in related engineering fields accepted. Prior in-field work experience can substitute for entry level positions.

Salaries

Low	Average	High
$54,554	$71,180	$91,541

18. Application Scientist

An Application Scientist teaches customers the proper application of photonics products. They are sometimes called field application scientists, technical support scientists, or field support scientists. **Application Scientists** need to be extremely familiar with not only the equipment and systems they represent, but also the general principles of the science behind the products to "interpret" the technical aspects of the products to customers without scientific backgrounds. They also train sales and support staff that need to be well informed about company product lines.

Educational Requirements

Optical Engineering, Physics

Degree	BS	MS	PhD	*
Required		■		*
Preferred			■	

* A MS may be sufficient with 5 years' experience as an application engineer.

Salaries

Low	Average	High
$41,396	$66,740	$100,532

19. Metrology Engineer

Metrology Engineers develop and evaluate calibration systems that measure characteristics of objects such as length, mass, time, temperature, electric current, luminous intensity, and derived units of physical or chemical measure. They identify and quantify magnitudes of error and redesign and/or adjust measurement capability to minimize errors, and develop calibration methods and techniques based on principles of measurement science, technical analysis of measurement problems, and accuracy and precision requirements.

Educational Requirements

Mechanical Engineering, Physics, Math

Degree	BS	MS	PhD	*
Required	■			
Preferred				*

* In-field experience is preferred.

Salaries

Low	Average	High
$39,283	$54,288	$70,119

20. Field Service Engineer

Field Service Engineers, also known as **Engineering Technicians**, travel to client service sites to install and repair a variety of equipment and networks. This includes scientific instruments and computerized systems. They establish and maintain business relationships with customers and perform necessary administrative duties related to the upkeep, maintenance and upgrade(s) of equipment. Though some positions require a bachelor's degree in mechanical engineering or a related field, many **Field Service Engineer** jobs only require an associate degree or vocational school certificate in field service engineering.

Educational Requirements

Mechanical Engineering

Degree	BS	MS	PhD	*
Required				
Preferred	■			*

* An AA or vocational school certificate in field service engineering is sometimes sufficient for entry level positions.

Salaries

Low	Average	High
$45,770	$59,300	$78,134

21. Optical Software Engineer

Optical Software Engineers develop firmware and software to execute high-speed real time control systems for cutting-edge laser and electro-optical systems. Being an **Optical Sofware Engineer** requires experience in software programming, various scientific modeling software, elementary electrical engineering principles, as well as software control of scientific hardware. Roles also include testing, debugging and verification of high-speed, real-time control systems. Strong problem solving, troubleshooting, organizational skills and the ability to interface with engineers and production managers are useful skills.

Educational Requirements

Computer Science, Physics, Engineering, Mathematics

Degree	BS	MS	PhD	*
Required	■			*
Preferred		■		

* Requires optical engineering experience in addition to software programming skills.

Salaries

Low	Average	High
$40,973	$85,320	$107,291

22. Systems Engineer

Systems Engineering is an interdisciplinary field of engineering and engineering management that focuses on how to design, integrate and manage complex systems over their life cycles. **Systems Engineers** ensure that all likely aspects of a project or system are considered and integrated into a whole. **Systems Engineers** document requirements, then design and test systems to meet those needs. They also ensure that project budgets and timelines are adhered to by overseeing the project team(s).

Educational Requirements

BS / MS of PhD in Aerospace, Civil, Electrical, Optical, or Mechanical Engineering

Degree	BS	MS	PhD	*
Required	■			*
Preferred		■		

* Technical & management experience

Salaries

Low	Average	High
$51,000	$83,006	$99,863

23. Systems Architect

A **Systems Architect** defines system specifications from product requirements, identifies and drives architectural tradeoffs, develops system level models, and closes the loop between measured performance and design expectation. **Systems Architects** interface between users, stakeholders and engineers to act as a mediator, reconciling the users' needs and requirements with what the engineers have determined to be doable within the given (engineering) constraints. An extensive background in optical physics, device design, and photonic system design will be required for most positions.

Educational Requirements

Aerospace, Civil, Electrical, Optical, or Mechanical Engineering

Degree	BS	MS	PhD	*
Required		■		*
Preferred			■	

* A minimum of 5 years of experience in photonic system & architecture design

Salaries

Low	Average	High
$63,000	$109,815	$142,397

24. Imaging Scientist

An **Imaging Scientist** specializes in designing and developing imaging systems through extensive image studies. Their responsibilities include conducting research and analysis, coordinating with staff and other experts, gathering and analyzing data through various scientific procedures, maintaining records, and summarizing findings. They typically develop prototypes and test structure to ensure its imaging quality. **Imaging Scientists** maintain an active communication line with team members for a smooth and efficient workflow. Compared to other jobs, **Imaging Scientists** have a growth rate described as "faster than average" at 8% between the years 2018 – 2028.

Educational Requirements

Engineering, Optical Engineering, Physics.

Degree	BS	MS	PhD	*
Required			■	*
Preferred				

* A minimum of 5 years of experience in photonic system & architecture design and modeling is almost always required.

Salaries

Low	Average	High
$43,459	$82,405	$121,130

25. Optical Research Scientist

Optical Research Scientists are responsible for designing, undertaking and analyzing information from controlled laboratory-based investigations, experiments and trials. Skills required are the ability to develop and conduct systematic experimental studies, read and interpret data, and present findings in publications and reports. **Optical Research Scientist**s have opportunities for employment in corporate research and development, government laboratories, environmental organizations, specialist research organizations or universities. Day-to-day duties vary depending on the project and company.

Educational Requirements

Engineering, Optical Engineering, Physics.

Degree	BS	MS	PhD	*
Required			■	*
Preferred				

* A minimum of 5 years of experience in photonic system & architecture design and modeling is almost always required.

Salaries

Low	Average	High
$48,082	$77,784	$109,109

26. Principal Investigator

A **Principal Investigator (PI)** in Research is *the* primary individual responsible for the preparation, execution, and administration of a research grant, cooperative agreement, training or public service project, contract, or other sponsored project. The **Principal Investigator** ensures compliance with applicable laws, regulations and institutional policy. The **PI** has the authority to delegate responsibility to individual members of the research team; however, the **PI** is ultimately responsible for the overall conduct of the research study. The career of **Principal Investigator** requires at least a bachelor's degree in a subject related to the **PI**'s field of research.

Educational Requirements

Engineering, Optical Engineering, Physics.

Degree	BS	MS	PhD	*
Required	■			*
Preferred		■		

* Formal training in ethical principles of conducting research trials.

Salaries

Low	Average	High
$50,393	$115,509	$162,278

27. Optical Teaching Professor

An **Optical Teaching Professor** typically requires the same levels of education as a research science, the difference being that the focus is on remaining in higher education and blending research with teaching. An **Optical Teaching Professor** will have opportunites and expectations to advance knowledge in the field through ongoing research and publication, but the full-time laboratory-based design and undertaking of experimental trials will be supplementary to the primary mission of teaching students (often at the graduate level) in the field of optical engineering.

Educational Requirements

Engineering, Optical Engineering, Physics.

Degree	BS	MS	PhD	*
Required	■			*
Preferred		■		

* Formal training in ethical principles of conducting research trials.

Salaries

Low	Average	High
$47,620	$88,094	$138,699

OPERATIONS

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Operations refers to the division of a company that produces products, manages quality, and creates services. Operations is one of the major functions in an organization along with supply chains, marketing, finance and human resources. The operations function requires management of both the strategic and day-to-day production of goods and services. In photonics, there are three types of engineers typically associated with operations.

- **Manufacturing Engineers** are more concerned with the initial research design, layout and build of the manufacturing process or system.
- **Production Engineers** and more focused on running the systems and place more emphasis on meeting production targets, inventory control, operations management, continuous improvement, elimination of waste, quality control, and quality assurance.
- **Industrial Engineers** are similar to production engineers but there is more emphasis on working with the front-line staff. They look for ways to make the workers' routines more efficient to improve production.

The follow section includes some of the careers in Optics and Photonics that fall under the category of Operations.

28. Manufacturing Engineer

An **Optical Manufacturing Engineer** designs and operates the manufacturing systems for photonic products including cameras, telescopes and lens systems. They choose the best technologies and processes to manufacture the product; plan and design the facility that will produce the product, and manage the running, maintenance, and continuous improvement of the manufacturing process. **Optical Manufacturing Engineers** may also be responsible for inventory control, quality management, quality control, material flow, cost analysis, procurement and supply chain management. There is a projected job growth of 10% from 2019 to 2029

Educational Requirements

Engineering

Degree	BS	MS	PhD	*
Required				*
Preferred				

* Additional certifications may be required

Salaries

Low	Average	High
$49,007	$63,874	$84,606

29. Manufacturing Engineer Manager

Manufacturing Engineering Managers will typically have prior experience as a manufacturing engineer, but have taken on additional supervisory responsibilites. As a manager, they oversee the development and implemntation of manufacturing processes to maintain proper product functionality and cost efficiency. They ensure the engineering team and other manufacturing departments work together cohesively and manage the day-to-day performance of subordinate staff. **Manufacturing Engineering Managers** also review, evaluate and implement engineering changes and specification requirements.

Educational Requirements

Manufacturing or Industrial Engineering

Degree	BS	MS	PhD	*
Required				*
Preferred				

* Prior in-field experience plus 1-3 years' supervisory experience is often required

Salaries

Low	Average	High
$71,661	$89,373	$100,788

30. Process Engineer

The **Process Engineer** is responsible for providing the chemical or biochemical processes and equipment that ultimately extract materials from their raw states and transform them into a beneficial or saleable end product (think of the manufacturing of glass from sand, soda, limestone, and clarifying agents). They develop, implement, and monitor the equipment in use and the process of the materials and the manufacturing systems. They usher the product along from start to finish; taking responsibility for the design, implementation, control, and optimization of the product's industrial processing phase.

Educational Requirements

Chemical, Manufacturing or Industrial Engineering

Degree	BS	MS	PhD	*
Required				
Preferred				*

* Prior in-field experience preferred

Salaries

Low	Average	High
$51,780	$70,569	$86,455

31. Quality Engineer

The **Quality (QA) Engineer** is responsible for determining production standards for a company's products by establishing quality control systems and setting product requirement rules. Their duties include identifying the specifications for an ideal product, determining an appropriate level of variation and monitoring quality assurance rates. **Quality Engineers** help create solutions as part of an engineering team. They work to find defects, determine the causes of those defects and provide solutions to defected problems. Certified quality engineers receive certification from the American Society for Quality (ASQ).

Educational Requirements

Engineering

Degree	BS	MS	PhD	*
Required				*
Preferred				

* Prior in-field experience required. ASQ Certification is preferred.

Salaries

Low	Average	High
$45,771	$67,067	$81,369

32. Quality Manager

A **Quality Manager**, or **Quality Assurance Manager**, is in charge of supervising the production process to ensure all products meet consistent standards. Their duties include developing and implementing quality control tests, inspecting products, writing reports and documenting production issues. They implement methods to inspect, test and evaluate products and production equipment, and prepare reports by collecting, analyzing and summarizing data. **Quality Managers** also train production line staff in production practices and quality assessment of products, eliminating products that are not up to standards and finding the reasons for errors or flaws in the production process.

Educational Requirements

Manufacturing or Industrial Engineering

Degree	BS	MS	PhD	*
Required				*
Preferred				*

* Prior in-field experience and ASQ Certification typically required

Salaries

Low	Average	High
$50,857	$69,499	$95,239

33. Production Manager

A **Production Manager**, or **Production Lead**, ensures that manufacturing equipment and tools function properly and increase or maintain efficiencies. Their duties include setting production schedules and managing teams to make sure processes stay on-time and within budget. They perform tasks such as taking inventory, making supply orders, and assessing safety standards. The most common certification required for production managers is the International Organization for Standardization's ISO 9001, which proves knowledge of quality management and global standards.

Educational Requirements

Manufacturing or Industrial Engineering

Degree	BS	MS	PhD	*
Required				*
Preferred				

* Prior in-field experience and ISO 9001 Certification typically required

Salaries

Low	Average	High
$42,071	$60,112	$80,907

34. Site Leader

The **Site Leader** focuses on the operation of equipment used by the facility to carry out their jobs. An example might be an observatory or laboratory, where the site leader would be responsible for executing regular preventative mantenance on telescopes, imaging equipment and instruments. They are also responsible for managing staff performance, ensuring the smooth delivery of daily operations. **Site Leaders** may also supervise upgrade or implementation projects, guiding the successful project completion by maximizing the staff's productivity within the specified timeframe and budget goals.

Educational Requirements

Engineering or Science

Degree	BS	MS	PhD	*
Required				
Preferred				*

* In-field experience preferred

Salaries

Low	Average	High
$34,212	$66,125	$118,819

35. Technical Procurement Engineer*

**** Also referred to as a Supply Chain Engineer***

The terms **Technical Procurement** and **Supply Chain Engineers** are often used interchangeably. Employees in those roles oversee the purchase of technical equipment for industrial or scientific operations. They collaborate with designers to determine the equipment for projects or operations, research vendors for that equipment, then order it. **Technical Procurement Engineers** also conduct needs assessments, supplier evaluations, and contract negotiations.

Educational Requirements

Engineering / Supply Chain Management

Degree	BS	MS	PhD	*
Required				
Preferred				*

* In-field experience preferred

Salaries

Low	Average	High
$44,384	$75,486	$109,910

36. New Product Introduction Engineer

New Product Introduction (NIP) Engineers are the driving force behind designing and presenting new products and innovative ideas. They set the tone for the design teams to work creatively, and transition ideas from design to engineering, manufacturing and supply-chain distribution. **NIP Engineers** may also work with the advertising teams to develop the "wow" factor presentations to showcase new products and innovations; ensuring that the company's products are well represented throughout the photonics and scientific industries.

Educational Requirements

Engineering / Manufacturing Engineering

Degree	BS	MS	PhD	*
Required				
Preferred				*

* Prior experience preferred as a test or process engineer

Salaries

Low	Average	High
$52,706	$80,068	$102,638

37. Test Technician

A **Test Technician** makes sure products meet quality standards and function properly. The tests these professionals perform vary depending on the product, but typical testing methods often involve monitoring, assembling, improving, and manipulating a product to ensure it is in no way defective. The education needed to become a **Test Technician** is an associate's degree in a field related to engineering technology.

Educational Requirements

Engineering

Degree	BS	MS	PhD	*
Required				
Preferred	■			*

* Entry level positions may accept an AA

Salaries

Low	Average	High
$27,000	$37,029	$51,316

38. Test Equipment Engineer

A **Test Equipment Engineer** determines how to create a process that would best test products in order to assure that the product meets applicable specifications. **Test Equipment Engineers** must have a broad-based knowledge of photonics, since they need to be familiar with not only what is being manufactured by their company, but also how the products are being used across the customer base. In addition, **Test Equipment Engineers** manage, train and support the test technicians who perform the actual testing either remotely at the customer's facilities or on-site during manufacture.

Educational Requirements

Engineering

Degree	BS	MS	PhD	*
Required				
Preferred	■			*

* Entry level positions may accept an AA

Salaries

Low	Average	High
$57,328	$81,215	$110,496

39. Optical Assembly Technician

An **Optical Assembly Technician**, also known as an **Ophthalmic Laboratory Technician,** fills prescriptions for eyeglass lenses and contact lenses. A technician usually works closely with an optometrist, or eye doctor, to ensure that each set of lenses is created correctly. Other common responsibilities include fitting glasses frames to suit the patient's face, checking the correct prescription is sent to the lab, and drafting records about each order that is filled. Some employers require **Optical Assembly Technicians** to perform administrative duties, such as updating patient records and verifying insurance policies.

Educational Requirements

AA Degree or Ophthalmic Training

Degree	BS	MS	PhD	*
Required				
Preferred				

* No advanced degree required

Salaries

Low	Average	High
$15,500	$35,061	$44,854

40. Optician

An **Optician** is responsible for helping customers achieve the right type of eyeglasses, lense shape or contact lenses in accordance with their eyesight or eye conditions. Their duties include communicating with other eye care professionals to receive prescriptions and send them to Laboratory Technicians, providing customers with sample frames to fit their prescriptions and maintaining accurate customer records. **Opticians** usually work as part of a team of eye care professionals that includes Ophthalmologists and Optometrists.

Educational Requirements

AA Degree in Opticianry

Degree	BS	MS	PhD	*
Required				*
Preferred	■			

* Additional certifications typically required

Salaries

Low	Average	High
$26,815	$32,321	$40,222

41. Optical Fabrication Technician

Also known as lens and prism makers, **Optical Fabrication Technicians** usually work in a lab or manufacturing setting. They make lenses to improve sight and fit them into frames (glasses). They must be able to read and understand blueprints and schematics and operate machinery to produce the prescribed lenses. **Optical Fabrication Technicians** are one example in the optics industry that allow high-school graduates to begin on-the-job training as an apprentice, then work to become a manager or supervisor of other technicians. The career may also lead to other opportunities for those wanting to pursue more education.

Educational Requirements

High School Degree with science and math

Degree	BS	MS	PhD	*
Required				
Preferred				*

* National Opticianry Competency Exam

Salaries

Low	Average	High
$25,428	$38,094	$49,469

42. Diamond-Turning Engineer

A **Diamond-Turning Engineer** will use single-point diamond turning as a manufacturing technique for producing precision optical components including off-axis parabolic (OAP) mirrors, off-axis elliptical (OAE) mirrors, spherical and aspheric lenses, and flatwork. Diamond turning, or single point diamond turning as it is sometimes known, was originally a term for turning mirror-quality surfaces on high-precision air bearing lathes, using an ultra sharp natural diamond cutting tool. The technique was developed largely in American nuclear weapons laboratories, where components having extremely demanding tolerances of fit, form, and finish are required.

Educational Requirements

High School Degree with science and math

Degree	BS	MS	PhD	*
Required	■			
Preferred				*

* In-field experience preferred

Salaries

Low	Average	High
$24,539	$60,354	$98,013

SALES & MARKETING

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Sales and Marketing are two business functions within an organization that impact lead generation and revenue. The term "sales" refers to all activities that lead to the selling of goods and services. "Marketing" is the process of getting people interested in the goods and services being sold. While these careers are much broader than the Photonics and Optics industry, they are critical roles in maintaining financial health and growth in these companies.

Sales is a term used to describe the activities that lead to the selling of goods or services. In the case of optics and photonics companies, these goods and services cater to other companies and end-users of optics and photonics products. Salespeople are responsible for managing relationships with clients and potential clients (prospects) and providing solutions to meet their needs. Sometimes salespeople take on the role of conveying client needs (such as improvement in service or alterations to existing products) back to the service or product design team to determine if a solution can be developed. This is why sales play a critical role in company growth and why the salesperson must thoroughly understand the product and services being offered by the company.

Marketing encompasses all activities that help grab attention or spark interest in a particular business. Marketing professionals use market research and analysis to understand the interests of potential customers and understand where to find them. Marketing departments are responsible for developiong material and campaigns to attract people to a company's brand, product, or service; conveying the solution(s) being offered by the company (why people would want the product or service); understanding the competition in order to keep the company one step ahead; and helping the company keep a focus on the most profitable and unique aspects of their business.

Both **Sales** and **Marketing** share a common goal: revenue generation.

The follow section includes some of the careers in Optics and Photonics that fall under the category of **Sales** and **Marketing**.

43. Sales Engineer

A **Sales Engineer** sells complex scientific and technological products or services to other businesses. They must have extensive knowledge of the services and/or products and product functions produced by their company. They also must understand details about how and why their company's products and services work. **Sales Engineers** often bridge the gap between product development and sales functions. **Sales Engineers** may interact with potential customers but typically spend more time creating strategies to drive sales and to train the sales team to understand the technical features of their company's products in greater detail.

Educational Requirements

Engineering

Degree	BS	MS	PhD	*
Required	■			
Preferred		■		*

* In-field experience preferred

Salaries

Low	Average	High
$46,696	$70,010	$92,928

44. Key Account Manager

The **Key Account Manager** is responsible for handling the most important client accounts in a company. They will be the lead point of contact for all key client matters, anticipate the client's needs and help find solutions, work within the company to ensure client deadlines are met, and help the client succeed. The **Key Account Manager** acts as the client's representative in a firm to ensure their needs are met. They also work to improve the overall customer experience by collecting and analyzing client data realted to consumer behavior to understand how to better serve clients.

Educational Requirements

Engineering / Business / Marketing

Degree	BS	MS	PhD	*
Required	■			
Preferred		■		*

* MBA and in-field experience preferred

Salaries

Low	Average	High
$41,609	$62,989	$91,541

45. Business Development Manager

The **Business Development Manager**, or **Business Development Executive**, is responsible for overseeing the implementation of business objectives for their company's sales, marketing and business development teams. They analyze market trends, compare current sales numbers to desired quotas, delegate sales and marketing tasks among team members, and regularly meet with upper management to discuss their findings. The **Business Development Manager** will also keep tabs on competitor companies, key player shifts in the industry, and stay abrest of key conferences and forums that will support company goals. They may also support upper management by organizing meetings between clients and company executives.

Educational Requirements

Engineering / Business / Marketing

Degree	BS	MS	PhD	*
Required	■			
Preferred		■		*

* MBA and in-field experience preferred

Salaries

Low	Average	High
$38,373	$58,725	$88,304

46. Sales Manager

Sales Managers direct the distribution of their company's products to customers. **Sales Managers** lead and guide the sales team. They set sales goals and quotas, build quarterly and annual sales plans, track and analyze data, assign sales training and sales territories, mentor members of the sales team, and are involved in the hiring and firing of team members. Additional responsibilities of the **Sales Manager** include pricing recommendations and helping to develop promotional, sales, and marketing strategies. In larger companies, they also request market research, specific advertising campaigns, and make recommendations for product development and public relations activities.

Educational Requirements

Engineering / Business / Marketing

Degree	BS	MS	PhD	*
Required				
Preferred				*

* In-field experience preferred

Salaries

Low	Average	High
$31,000	$60,134	$95,703

47. OEM Sales Manager or Engineer

Original Equipment Manufacturing (OEM) involves manufacturing technical and scientific products that will be re-sold by companies under their own brand. The **OEM Sales Manager** carries out many of the same duties as a sales manager such as setting sales goals and managing sales teams. Typically, the **OEM Sales Manager** has a much higher level of technical expertise which comes into play when customers are purchasing products/parts for integration into larger, more advanced products. In these instances, they becomes the client interface to ensure technical specs and compatibility requirements are conveyed accurately.

Educational Requirements

Engineering / Business / Marketing

Degree	BS	MS	PhD	*
Required				
Preferred				*

* In-field experience preferred

Salaries

Low	Average	High
$40,000	$78,069	$101,712

48. Channel Sales Manager

A **Channel Manager** works with sales or marketing within a specific channel. Channels may be assigned based on **geography**, **product type** or **market**. The Channel Manager is responsible for achieving sales, profitability, and partner recruitment objectives. Responsibilites range from fostering relationships with potential or existing channel partners and clients, creating and implementing sales growth strategies to increase profitability, closing difficult sales, and working on the recruitment of new sales and marketing partners. They may also moderate discussions between the marketing team and channel partners.

Educational Requirements

Engineering / Business / Marketing

Degree	BS	MS	PhD	*
Required				
Preferred				*

* In-field experience preferred

Salaries

Low	Average	High
$54,554	$82,236	$110,034

49. Regional Sales Manager (RSM)

A **Regional Sales Manager** monitors the sales and distribution of goods and services within a specific region. Duties of a **Regional Sales Manager** include analyzing expenses and cost estimates; ensuring that operations meet budget goals with the highest quality; researching current market trends for sales performance development; providing sales training, and presenting sales reports. A **Regional Sales Manager** must have strong leadership and decision-making skills to enforce policies and procedures and to make changes that will boost operations performance.

Educational Requirements

Engineering / Business / Marketing

Degree	BS	MS	PhD	*
Required	■			
Preferred				*

* In-field experience preferred

Salaries

Low	Average	High
$48,083	$78,995	$109,109

50. Director of Sales

The **Director of Sales** is responible for the profitibility of the company and creates conditions for high-quality service. The **Director of Sales** is responsible for not only managing the sales team, but ensuring that members comply with sales strategies. They oversee the areas of sales planning, human resource management, employee development, resource control, and distribution of products on the market. The **Director of Sales** must also analyze sales data and provide reports and/or updates on stragies for increasing profits, fielding customer requests, and resolving complaints.

Educational Requirements

Engineering / Business / Marketing

Degree	BS	MS	PhD	*
Required	■			
Preferred		■		*

* MBA and in-field experience preferred

Salaries

Low	Average	High
$47,157	$84,066	$119,282

51. Marketing Manager

The **Marketing Manager** oversees all marketing efforts that target sales opportunities for a company's products and services. They supervise the marketing team, lead initiatives to identify potential clients, brand, brainstorm campaigns, create budgets, and analyze results for strategic planning. They brainstorm ideas for new campaigns, coordinating with the sales team and other departments to produce effective strategies. The **Marketing Manager** monitors current campaigns to ensure their staff meets deadlines and completes necessary tasks. To stay current on marketing trends, they also analyze industry and competitor data on a regular basis to evaluate the success of their marketing.

Educational Requirements

Marketing / Business Administration

Degree	BS	MS	PhD	*
Required	■			
Preferred				*

* In-field experience preferred

Salaries

Low	Average	High
$41,147	$61,107	$85,530

52. Marketing Communications Manager

A **Markeing Communication Manager** creates, implements and oversees communication programs and material that effectively describes and promotes the organization and its products/services. Materials created include graphics, brochures, company or product fact sheets, logos, and other promotional products. They handle research and development of content for publication, create informative and timely content, and manage information dissemination. Additionally, they oversee the preparation of presentation and/or speeches that showcase the company and/or its executives.

Educational Requirements

Marketing / Publications / Communication

Degree	BS	MS	PhD	*
Required				
Preferred				*

* In-field experience preferred

Salaries

Low	Average	High
$41,148	$62,516	$78,134

53. Product Manager

Product Managers are in charge of forecasting, analyzing, and developing strategies to design and implement the release of technical products. **Product Manager** job duties may include assessing current market trends and consumer needs to decide where new market niches are emerging. Once those niches have been identified, they review the company's existing products to determine how the new product may fit into the product line. The **Product Manager** is also in charge of the team that coordinates with the R&D team and, develops and implements the release of new technical products to fill these niches.

Educational Requirements

Engineering / Business

Degree	BS	MS	PhD	*
Required				
Preferred				*

* In-field experience preferred

Salaries

Low	Average	High
$45,000	$82,072	$116,044

54. Product Marketing Manager

A **Product Marketing Manager** works as part of the product team to help manage a company's brand and drive sales. Duties include examining the preferences and needs of customers to fine-tune the marketing of products, analyzing competitors, and informing the sales team of the marketing strategy. They also determine the appropriate market(s) for products based on consumer data and research. The **Product Marketing Manager** role typically involves some travel to meet with clients and and give product demonstrations at trade shows and conferences.

Educational Requirements

Marketing

Degree	BS	MS	PhD	*
Required				
Preferred				*

* In-field experience preferred

Salaries

Low	Average	High
$52,000	$78,879	$115,120

55. Technology Analyst

A **Technology Analyst**, or a **Technical Analyst**, offers improvements and suggests updates to ensure optical systems stay up-to-date on performance standards. Depending on the company, there may be some hands-on troubleshooting and maintenance of the products, especially in a manufacturing setting. However, most of the time, the duties of a **Technology Analyst** are to advise the design and production teams on new technologies and/or market trends so the company is in a position to continuosly improve the products and services offered.

Educational Requirements

Marketing

Degree	BS	MS	PhD	*
Required				
Preferred				*

* In-field experience preferred

Salaries

Low	Average	High
$42,500	$66,755	$80,907

56. Inside Sales Engineer

Inside Sales Engineers sell advanced scientific and technical products to businesses and organizations. **Inside Sales Engineers** have training in both engineering (or an industry-related field) and sales. They act as negotiators between sales units and the clients and work to increase company profits and revenue by leveraging their specialized technical knowledge. An **Inside Sales Engineer** helps envision, design and sell new products or programs in order to increase output and profit. Additional duties include creating specialized sales reports, crafting sales plans and programs, and providing technical expertise/advice to clients.

Educational Requirements

AA Required, BS Engineering Preferred

Degree	BS	MS	PhD	*
Required				*
Preferred				

* Sales and marketing experience or training is also required

Salaries

Low	Average	High
$44,845	$60,532	$77,208

57. International Sale Manager

An **International Sales Manager** manages and directs a sales force to achieve global outreach in terms of sales and profit goals. They design and recommend sales and marketing programs, and set short-and long-term sales strategies. Responsibilities of the **International Sales Manager** include maximizing sales revenue in existing markets, expanding sales into new territories, and researching trends to develop accurate sales projections. The **International Sales Manager** creates a business development plan for international clients acquisition to boost global sales quotas and profitability goals. The career typically requires international travel.

Educational Requirements

Engineering / International Business

Degree	BS	MS	PhD	*
Required				*
Preferred				

* International sales experience preferred

Salaries

Low	Average	High
$40,000	$79,914	$110,034

58. International Sales Engineer

International Sales Engineers sell advanced scientific and technical products to businesses and organizations across the globe. The position requires both an in-depth technical knowledge of the products and often, the ability to speak a foreign language. The **International Sales Engineer** may be called upon to present at international conferences and/or support and/or train customers in understanding how to use their products. **International Sales Engineers** could be considered an example of "channel sales" – since the focus is specifically targeted to international clients. This career typically requires international travel.

Educational Requirements

Engineering / International Business

Degree	BS	MS	PhD	*
Required				*
Preferred				

* Second language(s) may be required

Salaries

Low	Average	High
$44,383	$74,432	$101,713

59. Technical Writer

Technical Writers are responsible for the consistency and clarity of technical content within their organization. Because technical writing is versatile in nature and demand, it can be found across many departments, including marketing, sales, and customer relations. **Technical Writers** often assist research scientists and institutions with writing grants and proposals and prepare instruction manuals, how-to guides, journal articles and other documents that clarify complex and technical information for their readers.

Educational Requirements

Journalism / Engineering

Degree	BS	MS	PhD	*
Required				*
Preferred				

* In-field knowledge plus writing skills

Salaries

Low	Average	High
$41,609	$60,112	$83,220

60. Principle Technical Writer

In larger corporations, a **Principle Technical Writer** sets the standards and formats for all documentation. They develop templates for each document type (i.e. functional/technical specifications, user guides, training materials, etc.) and train developers, engineers and marketing teams on how to use the templates to create their materials. They also oversee the technical writers who edit and finalize materials from the designers and engineers to ensure they apply consistent standards. Finally, the **Principle Technical Writer** monitors and updates documents to include all changes and updates to existing products. This career typically requires over ten years in the industry or in a closely-related industry.

Educational Requirements

Journalism / Engineering

Degree	BS	MS	PhD	*
Required				*
Preferred				

* Extensive in-field knowledge plus writing skills

Salaries

Low	Average	High
$48,544	$90,360	$123,433

Educational Institutions

Offering AA Degree and Certificate Programs

Listed in alphabetical order

Institution	Offerings	Contact Information
Hillsborough Community College 1206 N Park Rd Plant City, FL 33563	**Certificate(s)** • Laser and Photonics Certificate	**Dale Madry** Admissions & Registration (813) 253-7000
Indian River State College • Massey Campus 3209 Virginia Avenue Fort Pierce, FL 34981 • Chastain Campus 2400 S.E. Salerno Road Stuart, FL 34997 • Dixon Hendry Campus 2229 NW 9th Ave Okeechobee, Florida 34972 • Mueller Campus 6155 College Lane Vero Beach, FL 32966 • Pruitt Campus 500 N.W. California Blvd Port St. Lucie, FL 34986	**Certificate(s)** • Lasers and Photonics Certificate (60290)	**Massey Campus (Ft. Pierce)** **Lauren Hays** Electronics Engineering Technology Program Coordinator - LASER-TEC NSF lhayes@irsc.edu
Palm Beach State College 4200 Congress Avenue Lake Worth, FL 33461	**Specialty Course(s)** • Electronic Fabrication and Fiber Optics, Physical and Geometric Optics	**Palm Beach State College** (561) 967-7222
Seminole State College 100 Weldon Blvd Sanford, FL 32773	**Degree(s) and Programs** • Associate in Arts Photonic Science and Engineering Pathway	**G. Mendoza** (407) 971-5080 mmendozag@seminole.edu
Valencia College 1800 S Kirkman Rd Orlando, FL 32811	**Technical Certificate(s)** • Laser and Photonics Technician **Specialty Courses** • ets 1220c. Introduction to Photonics • ets 4216c Geometrical and Wave Optics • ets 4217c. Optical Engineering and Lens Design • ets 4236c Laser Engineering Design • ets 2230c Introduction to Lasers	**West Campus Engineering Dept.** (407) 582-1904

Offering Bachelor of Science and Master of Science Programs

Listed in alphabetical order

Institution	Offerings	Contact Information
Florida Atlantic University Harbor Branch 5600 U.S. 1 Fort Pierce, FL 34946	**Degree(s) and Programs** • Ocean Optics Program	**FAU Harbor Branch** (772) 242-2400 https://www.fau.edu/hboi/
Florida Institute of Technology 150 W University Blvd Melbourne, FL 32901	**Degree(s) and Programs** • Masters in Engineering with a specialization in Photonics	**College of Engineering & Science** (321) 674-8020 www.fit.edu
University of Central Florida 4000 Central Florida Blvd Orlando, FL 32816	**Degree(s) and Programs** • Bachelors of Science Photonic Science and Engineering • Master of Science, Optics and Photonics • Online Master of Science, Optics and Photonics	**The College of Optics and Photonics (CREOL)** (407) 823-6800 creol@ucf.edu www.creol.ecf.edu
University of Florida Gainesville, FL 32611	**Degree(s) and Programs** • Bachelor of Science in Physics with a Specialization in Optics	**Advising Department** (352) 392-0521 advising@phys.efl.edu www.ufl.edu
University of Miami 1320 S Dixie Hwy Coral Gables, FL 33146	**Degree(s) and Programs** • MS Electrical and Computer Engineering with a Microdevices and Photonics Track	**College of Engineering** (305) 284-2404 www.grad.miami.edu

Offering PhD Programs

Institution	Offerings	Contact Information
Florida A&M University 1601 S Martin Luther King Jr Blvd, Tallahassee, FL 32307	**Degree(s) and Programs** PhD in Physics with a concentration in Laser ablation or Laser interactions with matter.	**Department of Physics** (850) 599-3470 www.famu.edu
Florida International University 11200 SW 8th St Miami, FL 33199	**Degree(s) and Programs** • PhD in Nanoscale electronics and Photonics	**Sara-Michelle Lemus** Assists students applying for graduate degrees in Engineering (305) 348-1890 grad_eng@fiu.edu www.fiu.edu
University of Central Florida 4000 Central Florida Blvd Orlando, FL 32816	**Degree(s) and Programs** • PhD Program in Optics and Photonics •	**The College of Optics and Photonics (CREOL)** (407) 823-6800 creol@ucf.edu https://creol.ucf.edu/academics/graduate/

List of Selected Florida Photonics Companies

The following list is a sample of Florida optics and photonics companies with substantial Florida operations; the list is not intended as a comprehensive list all photonics industry employers.

Analog Modules, Inc.

https://analogmodules.com

(407) 339-4355

Founded in 1979 and located in Longwood, Florida (part of Greater Orlando), Analog Modules, Inc. (AMI) designs and manufactures a wide range of analog electronic products primarily for the laser and electro-optics industries. Their products serve applications in medical, military, scientific, and industrial markets. AMI's employees have over 100 years of combined experience in the laser and electronics industries. In April 2001, AMI was acquired by HEICO Corporation as part of their Electronic Technologies Group.

BEAM Engineering for Advanced Measurements Co.

https://www.beamco.com

(407) 734-5222

BEAM Co. founded in 1996, manufactures diffractive waveplates. The diffractive waveplates developed by BEAM Co. are micron-thin optical coatings capable of performing the same functions as lenses, prisms, spiral phase plates, shutters and axicons. Unlike normal diffractive optical components, diffractive waveplates can be produced with near 100% diffraction efficiency, broad spectrum UV to IR, and either passive or electro-switchable.

BRIDG

https://gobridg.com

Established in Florida as a not-for-profit, BRIDG is an industry-friendly, public-private partnership that is focused on semiconductor manufacturing processes and materials for advanced sensors, imagers, optics, photonics, and other transformational devices. BRIDG has capabilities that enable advances in many industries including medical, agricultural, space, defense, cybersecurity, food and environmental safety, autonomous vehicles, and critical infrastructure. Supported by Osceola County, the University of Central Florida (during it's inception), and the Florida High Tech Corridor Council, BRIDG facilitates the connection between innovation and industry.

Quality Thin Films (QTF) - Edmond Optics

https://www.edmundoptics.com

(856) 547-3488 ext. 6137

Since 1942, Edmund Optics® (EO) has been a leading global manufacturer and supplier of optics, imaging, and photonics technology serving a variety of markets that including Life Sciences, Biomedical, Industrial Inspection, Semiconductor, R&D, and Defense. EO designs and manufactures a wide selection of optical components, multi-element lenses, imaging systems, and optomechanical equipment, while supporting original equipment manufacturer (OEM) applications with volume production of stock and custom products. In late 2020, Edmund Optics acquired QTF, a leader in the industry offering a wide range of optical components with high laser damage threshold and laser crystal coatings from the UV to the far IR. The acquisition allows Edmund Optics to expand its laser optics manufacturing capabilities across crystal and glass fabrication, polishing, metrology, high laser damage threshold and diamond-like carbon coatings, inspection, and testing. QTF has a 14,000 sq ft facility, located outside of Tampa.

ER Precision Optical

https://eroptics.com

(407) 292-5395

E.R. Precision Optical is based in downtown Orlando, Florida and specializes in the manufacture of precision optical components formed from all materials. They are the only US-based facility growing both their own custom germanium and silicon crystals (ingots) for use in today's advanced infrared (IR) targeting and sighting optics, windows, lenses, prisms & filters. E.R. Precision Optical services markets such as defense and aerospace, photonics, high tech electronics, semiconductor, automotive, and photovoltaic and medical, while also supplying IR materials and custom finished optics for numerous applications. Additionally, E.R. Precision Optical recycles Germanium (Ge). They are the only 100%, full-capability facility with a germanium reclaim/recycling program that produces new germanium crystals from old, obsolete, damaged Ge windows and optics.

Everix, Inc.

https://www.everixopticalfilters.com

(407) 637-2987

Everix, Inc. produces a wide variety of optical filters, including customized OEM filters, to meet the needs of the photonics community. Based out of Orlando, they specialize in the custom design and manufacturing of high-performance interference optical filters with hundreds to thousands of nano-layers for high wavelength selectivity and spectrum customization. The company's proprietary technology for non-deposition fabrication of simple to complex interference optical filters with both rigid and flexible substrates enable consistent volume production beyond conventional possibilities. Everix' new manufacturing approach lifts some key limits the optical coating industry has had even after four decades of maturity. Everix provides advantageous alternatives for many existing markets and enables several new markets previously prohibitive due to the coating technology limits.

Imec USA

https://imec-int.com/en

(407) 749-7817

Founded in 1984, Imec quickly made its name as the leading research hub for nano-electronics and digital technologies. They create groundbreaking innovation in application domains such as healthcare, smart cities and mobility, logistics and manufacturing, and energy. Imec is headquartered in Leuven, Belgium and has R&D teams at universities in the Netherlands, Taiwan, USA, China, and offices in India and Japan. The Imec USA design center will focus on the R&D of high-speed electronics and photonics solutions, starting with an offering of IC design research for a broad set of semiconductor-based solutions such as THz and LIDAR sensors, IR imagers, and a broad range of sensors.

Imperx, Inc.

https://www.imperx.com

(561) 989-0006

Imperx, Inc. is a designer and manufacturer of ruggedized cameras which operate in extreme conditions. Their products are used for various industrial, commercial, military and aerospace imaging applications including flat panel inspection, biometrics, aerial mapping, surveillance, traffic management, semiconductors & electronics, scientific & medical Imaging, printing,

homeland security, space exploration, and other imaging and machine vision applications. Imperx' products are used wherever there is a need to capture high-resolution digital color or black/white images for both still and full-rate motion processing.

Infrared Associates

http://irassociates.com

(772) 223-6670

InfraRed Associates, Inc. was established in 1976. Originally located in New Jersey, the company moved and re-formed in 1997 in Stuart, Florida. Their mission is the design, development, manufacturing, sales and distribution of infrared devices and accessories. Infrared Associates devices are used in a wide range of applications including analytical, medical, environmental, and industrial. Their company continues to support large OEM shipments to various industry groups in the U.S., Europe, and Asia.

Infrared Systems Development Corp.

http://www.infraredsystems.com

(407) 679-5101

Infrared Systems Development Corporation offers a wide variety of infrared test equipment including calibrated blackbody sources, infrared detector preamplifiers, spectral radiometer systems, energy modulators, high speed pulse integration systems, and much more. They also develop systems for custom applications and offer design consulting services for many infrared instrument and sub-system projects. All their products are developed and manufactured in their newly expanded facility in Orlando, Florida.

JENOPTIK Optical Systems, Inc.

https://www.jenoptik.com

(561) 881-7400

Jenoptik, an industry leader in high performance optical systems for healthcare and advanced manufacturing industries, offers a broad portfolio of technologies such as optics, laser technology, digital imaging, opto-electronics, and sensors. The company serves clients in areas such as semiconductor equipment, laser material processing, healthcare and life science, industrial automation, automotive and mobility, and safety, as well as research institutes. In late 2020, Jenoptik opened a 70,000+ facility in Jupiter, Florida which, provided a new class 5

cleanroom, as well as an expanded production area and new equipment to further enhance manufacturing and testing capabilities.

L3Harris Corp.

https://www.l3harris.com

(321) 727-4137

L3Harris is an agile global aerospace and defense technology innovator, delivering end-to-end solutions that meet customers' mission-critical needs. They provide advanced defense and commercial technologies across air, land, sea, space, and cyber domains. In mid-2019, the completion of the L3 – Harris Technologies merger created the state's largest aerospace and defense company and the 8th largest employer in Florida. L3Harris, employs 8,400 people across 40 locations in the state, including 7,000 in Central Florida with a large portion on the Space Coast where Harris has had its headquarters. With $17 billion in annual, L3Harris registers as the sixth largest defense company in the U.S.

LaserStar Technologies Corp.

https://www.laserstar.net/en

(407) 248-1142

LaserStar Technologies was founded in 1957 in Riverside, Rhode Island. They have facilities located in Riverside, Rhode Island, Orlando, FL, and Arcadia, CA. The resources and focus of the Company are concentrated in creating and maintaining excellence in its laser welding equipment, laser marking equipment and laser engraving systems and accompanying laser education programs and research activities. As one of the nation's leading suppliers of micro welding and marking laser systems, LaserStar Technologies offers a large selection of laser platforms, and the widest variety of optical viewing systems.

LightPath Technologies

http://www.lightpath.com

(407) 382-4003

Founded in 1985, LightPath Technologies is serving customers in the industrial, defense, telecommunications, testing and measurement, and medical industries. LightPath designs, manufactures, and distributes proprietary optical and infrared components including molded

glass aspheric lenses and assemblies, infrared lenses and thermal imaging assemblies, fused fiber collimators, and proprietary Black DiamondTM ("BD6") chalcogenide-based glass lenses.

Lockheed Martin Missiles & Fire Control

https://www.lockheedmartin.com/en-us/who-we-are/business-areas/missiles-and-fire-control.html

Lockheed Martin Missiles and Fire Control (MFC) is one of five Lockheed Martin business areas. MFC is a recognized designer, developer and manufacturer of precision engagement aerospace and defense systems for the U.S. and allied militaries. MFC develops, manufactures, and supports advanced combat, missile, rocket, manned and unmanned systems for military customers that include the U.S. Army, Navy, Air Force, Marine Corps, NASA, and dozens of foreign allies. MFC also offers a wide range of products and services for the global civil nuclear power industry and the military's green power initiatives.

Luminar Technologies

https://www.luminartech.com

(407) 955-4004

Luminar's vision is to power every autonomous vehicle with the only LiDAR capable of making them both safe and ubiquitous. Luminar's breakthrough LiDAR is built from the chip-up to deliver 50x better resolution and 10x longer range than the most advanced LiDARs available today.

Ocean Insight

https://www.oceaninsight.com

(727) 733-2447

In 1989 Ocean Optics, Inc. was founded by university researchers in Florida. Ocean Insight is a leading supplier of solutions for optical sensing – fundamental methods of measuring and interpreting the interaction of light with matter. They enable diverse applications in medical and biological research, environmental monitoring, life science, science education, and entertainment lighting and display. Their extensive line of complementary technologies includes spectrometers, chemical sensors, metrology instrumentation, optical fibers, and thin films and optics.

Optigrate Corp – An IPG Photonics Corp

https://optigrate.com

(407) 542-7704

OptiGrate Corp, founded in 1999, pioneered and successfully brought to market the innovative technology of volume Bragg grating based optical filters. The unique micro-optic components made by OptiGrate enable dramatic performance improvement of laser systems, vast miniaturization and cost reduction of analytical instruments and ultrafast lasers for medical, pharma, defense, nanotech, and other applications. OptiGrate supplies diffractive optical components to more than 500 customers on 6 continents, including government contractors, OEMs, and key academic players in optoelectronics, analytical, and semiconductor industries.

Optonetic

https://www.optonetic.com

(407) 857-4410

Optonetic is a precision optical coating services facility with expertise in thin-film processes for precision optical components located in Orlando, Florida for almost 20 years. From standard processes to custom requirements and prototypes to full-scale production, Optonetic utilizes the latest production evaporation techniques including Cold Plasma Assist, Hot Plasma Assist and Ion Assist. Optnetic technological advantage allows them to design and manufacture standard and custom coatings from 193nm to 12µm. Antireflection, High Reflectors, Filters, Mirrors, Ultra High LDT, Beamsplitters, Polarizers, Telecom and Infrared Coatings are all part of Optonetic's thin film offering.

Optronic Laboratories

https://optroniclabs.com

(407) 422-3171

Since 1970, Optronic Laboratories, LLC has developed and manufactured spectroradiometers, lamps, lamp standards and accessories that have improved the way the world measures optical radiation. From traceable light sources calibration and manufacture to characterization of performance-critical military NVIS displays, or quality testing of automotive and commercial product displays. Headquartered in Orlando, Florida, Optronic Laboratories designs and manufactures research-grade UV/VIS/NIR/IR measurement solutions.

Pangolin Laser Systems, Inc.

https://www.pangolin.com

(407) 299-2099

Pangolin is a world leader in the field of software and control hardware for laser display applications. Their systems span the spectrum from low-cost, credit-card-sized OEM modules to full-blown network and PC-based software solutions that control lasers along with audio, video and DMX-controlled lights. In addition to their laser control software and hardware, Pangolin also sells a silicon hybrid component called LASORB, which dramatically increases the lifetime of laser-diode-based products, by absorbing ESD and power surges.

Salvo Technologies

https://www.salvo-technologies.com

(888) 725-8605

Salvo Technologies Inc. was created in 2006 to fund and develop manufacturing companies in the defense market with a strong focus on soldier safety. They provide innovative solutions, delivering beyond expectations. The various divisions of Salvo Technologies Inc. provide an integrated suite of technologies to serve the security and defense, medical, industrial, semiconductor, commercial, and science and technology markets. The company has grown to its current size through a combination of strategic acquisition and organic growth, with an overall focus on providing customers with a one stop shop for their technology needs. Salvo has been on a growth trajectory acquiring Arrow Thin Films, Spectrecology LLC, and Keischer Optics Ltd all in early 2021.

StellarNet, Inc.

https://www.stellarnet.us

(813) 855-8687

StellarNet, Inc. is a Global provider of low-cost compact spectrometers, systems, and software for product analysis, research, education, and OEM. StellarNet instrumentation is research grade and rugged for any environment – lab, process, or field.

Tecport Optics

https://tecportoptics.com

(407) 855-1212

Founded in 1997, Tecport Optics designs, manufactures, sells, and services state-of-the-art thin film vacuum deposition systems. Working vigorously with its world-class instrument suppliers, Tecport builds the most reliable, efficient, and flexible coating systems in the world, customized to meet the technical specifications of a variety of industries.

Tower Optical Corporation

http://www.toweroptical.com

(561) 740-2525

Founded in 1978, Tower Optical Corporation is a premier manufacturer and producer of high-quality precision optics and assemblies. They are a supplier to manufacturers of electro-optics, lasers, telecommunications, medical instruments, optical imaging, and optical computing. Its customers represent a broad variety of companies and industries including military, aircraft, aerospace, medical, university researchers and key U.S. Department of Defense contractors.

TwinStar Optics, Coatings & Crystals

http://www.twinstaroptics.com

(727) 847-2300

TwinStar is a global leader in the fabrication and coating of precision optics and crystals. TwinStar fabricates waveplates, etalons, lens ducts, laser slabs/rods, prisms, mirrors, and provides bonding and optical assembly services and works with linear/non-linear laser crystals including YAG, KTP, LBO, Kigre glasses.

Ultrafast Systems LLC

https://ultrafastsystems.com

(941) 360-2161

Ultrafast Systems was formed in 2002 and is headquartered in Sarasota, Florida. They specialize in the design and manufacture of time-resolved laser spectrometers. Their family of products contains many spectrometers with extremely broad spectral and temporal coverage for absorption and emission measurements. Ultrafast Systems particular focus is on providing researchers with the most advanced and relevant tools while keeping their instrumentation

easy to use. Their instruments are largely automated while some feature full automation. Their instruments are being employed in many aspects of research in modern photoscience, such as photophysics, photochemistry, photobiology, materials science, nanoscience, and solar energy conversion and storage.

Vision Engineering Solutions

www.Vision.Engineering

(407) 412-7611

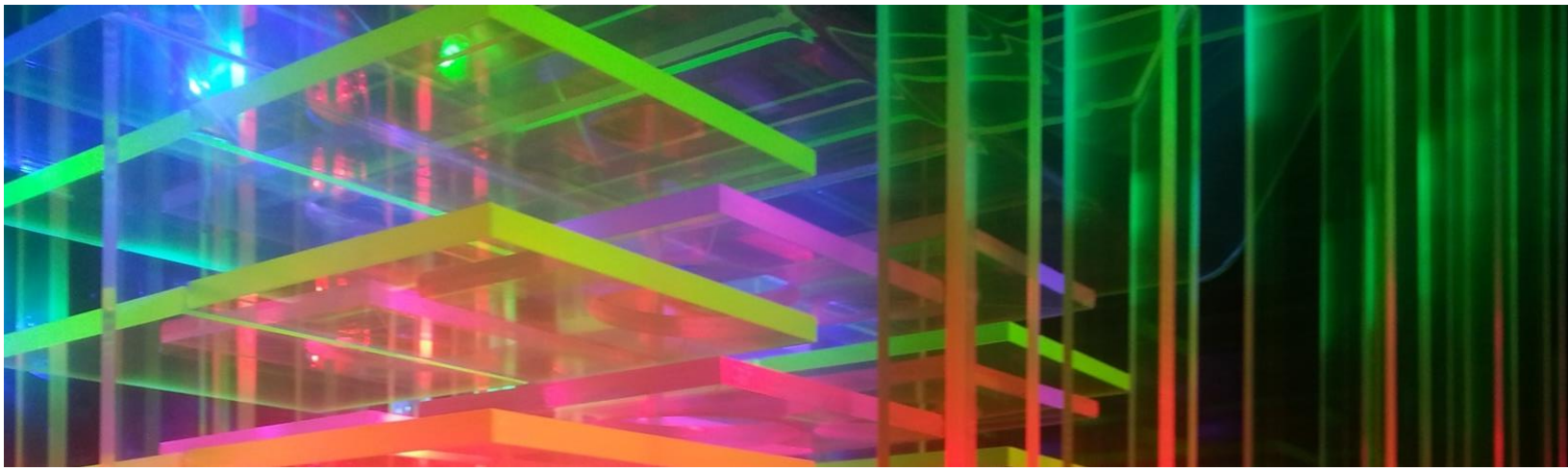
Vision Engineering Solutions, LLC is an award-winning team of experienced professionals providing advanced sensing solutions for defense, aerospace, and industrial applications. The company's areas of expertise are advanced imaging and sensing; pointing and tracking systems; data collection and analysis; and modeling and simulation. Vision Engineering is a winner of the 2013 Sikorsky Entrepreneurial Challenge, and the recipient of a Congressional Medal of Recognition from Congressman Bill Posey's office as the Rising Star in Technology at the 2014 TechNovation Awards sponsored by the Melbourne Regional Chamber of Commerce.

X-lumin

https://x-lumin.com

(321) 208-7840

X-lumin was incorporated in early 2019 as a spin-off from Vision Engineering Solutions LLC. X-lumin was formed as it became clear that many of the optical and laser technology solutions being developed for the government had commercial application potential with additional attention and focus, free of encumbrances. X-lumin provides turn-key systems for ground-to-space laser communication; land-based optical wireless communication, and space situational awareness with advanced integration capabilities including laser safety. Their solutions are typically "whole system solutions" that come with one of the most versatile and comprehensive software platforms for managing Precision Optical Pointing and Tracking (OP&T).



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FLORIDA

Florida Photonics Cluster

OpticsProfessionals LLC
Recruitment Specialists In Optics,
Photonics And Imaging Technology