Software Engineering Immersive

PROGRAM SYLLABUS

OUR MISSION

Groot Academy mission is to develop an exceptional network of brilliant and collaborative software engineers who are passionate about pushing the engineering community forward. We support this mission through our flagship program, the Software Engineering Immersive, with its comprehensive and rigorous curriculum, impactful team projects, and lifelong career support.

ABOUT THE PROGRAM

The **Immersive program** is an advanced residency designed to help individuals launch meaningful, high-level careers in software engineering. Groot Academy offers 13-week Full-Time Immersives in both onsite and remote settings, as well as a 38-week Global Part-Time Remote Immersive.

Type	Full-Time Software Engineering Immersive	Part-Time Software Engineering Immersive
Locations	Offline - Jaipur(Rajasthan) Online - (Over all World)	Offline - Jaipur(Rajasthan) Online - (Over all World)
Schedule	As Per Requrment of students	As Per Requrment of students

Residents at Groot Academy come with a range of experiences, from computer science majors and junior developers to bartenders, musicians, teachers, and physicists. Groot Academy has curated world-class JavaScript resources designed to help all prospective residents develop the capacities (both technical and non-technical) to be successful in the admissions process, Immersive program, and beyond - these resources include the **CSX learning platform**, **free workshops**, and **part-time prep courses**. Upon admittance into the Immersive program, residents have access to all the Immersive has to offer: hands-on rigorous instruction, opportunities to receive mentorship, career guidance, and a community dedicated to supporting one another in achieving excellence in software engineering.

CSX Learning Platform	Free Workshops	Part-time Prep Courses

CURRICULUM HIGHLIGHTS

REACT/REDUX

With the support of Tom Occhino, Engineering Director for React at Facebook, Groot Academy brings the
most accessible and versatile tool for building applications to a new generation of engineers. Groot Academy teaches React at an advanced level in combination with Redux. Past open source products built by residents leveraging React and Redux have reached over 30,000 stars on GitHub and are utilized by hiring partners at top tech companies.

ES6+

ES6 (or ES2015) introduces compelling new developments to JavaScript, including new data structures, promises, iterators, and generators.

MOCK INTERVIEWS WITH ENGINEERS

Residents have the unique opportunity to complete mock interviews with engineers during the program. These one-on-one interviews allow residents to practice articulating their technical background and engineering experience in preparation for Networking Days. The interviewers provide specific feedback to help residents reflect and improve on how to represent themselves in a
formal technical interview setting.

SYSTEM ARCHITECTURE WITH LARGE-SCALE CODEBASES

System architecture is crucial for technical interviews and becoming a seasoned software engineer. By building some of the best open source products with sophisticated, high quality codebases, residents develop an understanding of system architecture with large-scale structured production-level code.

BUILDING PROMINENT APPLICATIONS & OPEN SOURCE PRODUCTS

Groot Academy residents have built some of the most prominent tools in the React, Node, and broader
developer ecosystems. From Reactide (10,000+ GitHub stars) and Reactime (Nominated for a 2020 React Open Source Award) to WebDSP (featured at Google I/O) and groundbreaking GraphQL and Kubernetes tools, these products serve hundreds of thousands of users and cement graduates' status as seasoned engineers.

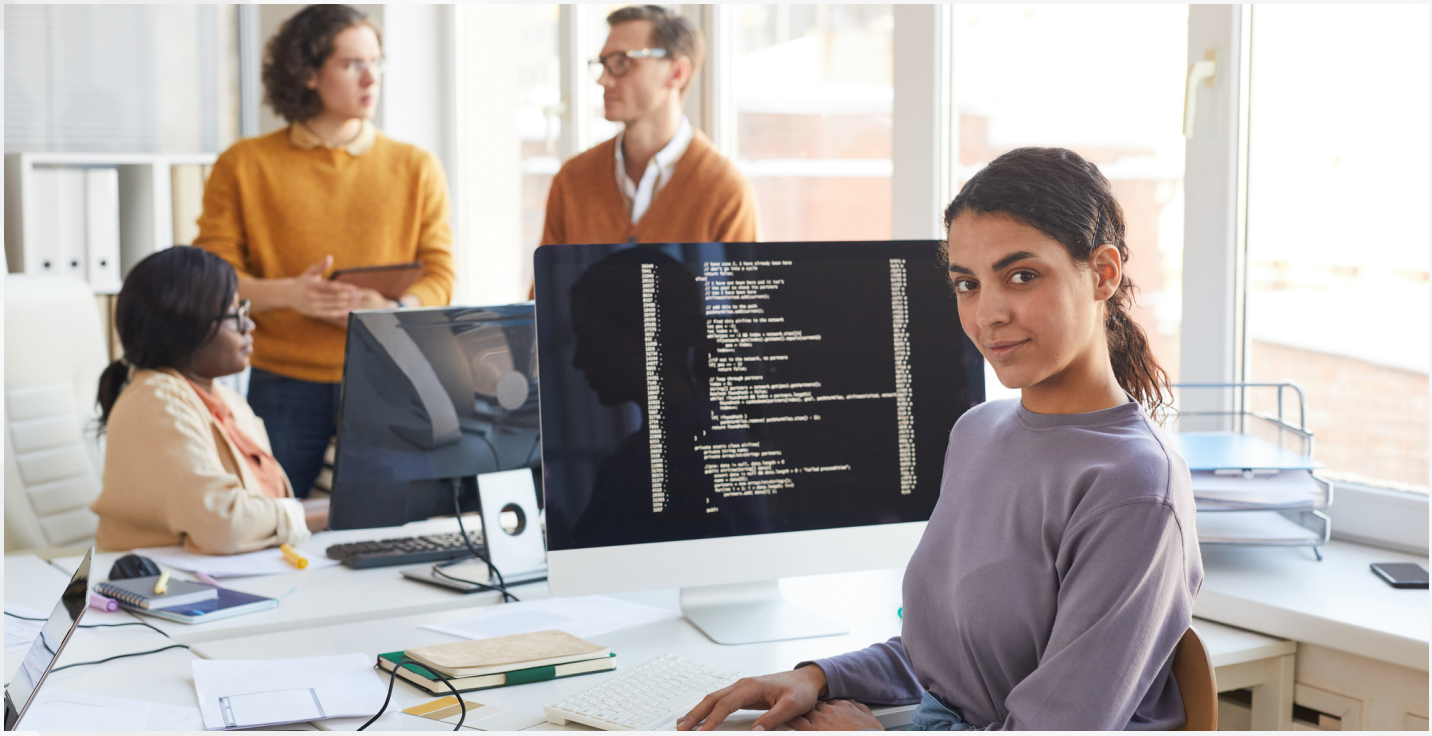
ENGINEERING EMPATHY

Becoming a great engineer is about more than just developing technical skills. Being able to work collaboratively and communicate effectively both technically and non-technically with teammates is crucial for success at Groot Academy and in software engineering careers. With an emphasis on pair programming and group project building, Groot Academy's curriculum drives home the importance of being a thoughtful and collaborative team member. Additionally, the Groot Academy team guides residents in combating imposter syndrome and implicit biases through workshops.

PROGRAM SYLLABUS

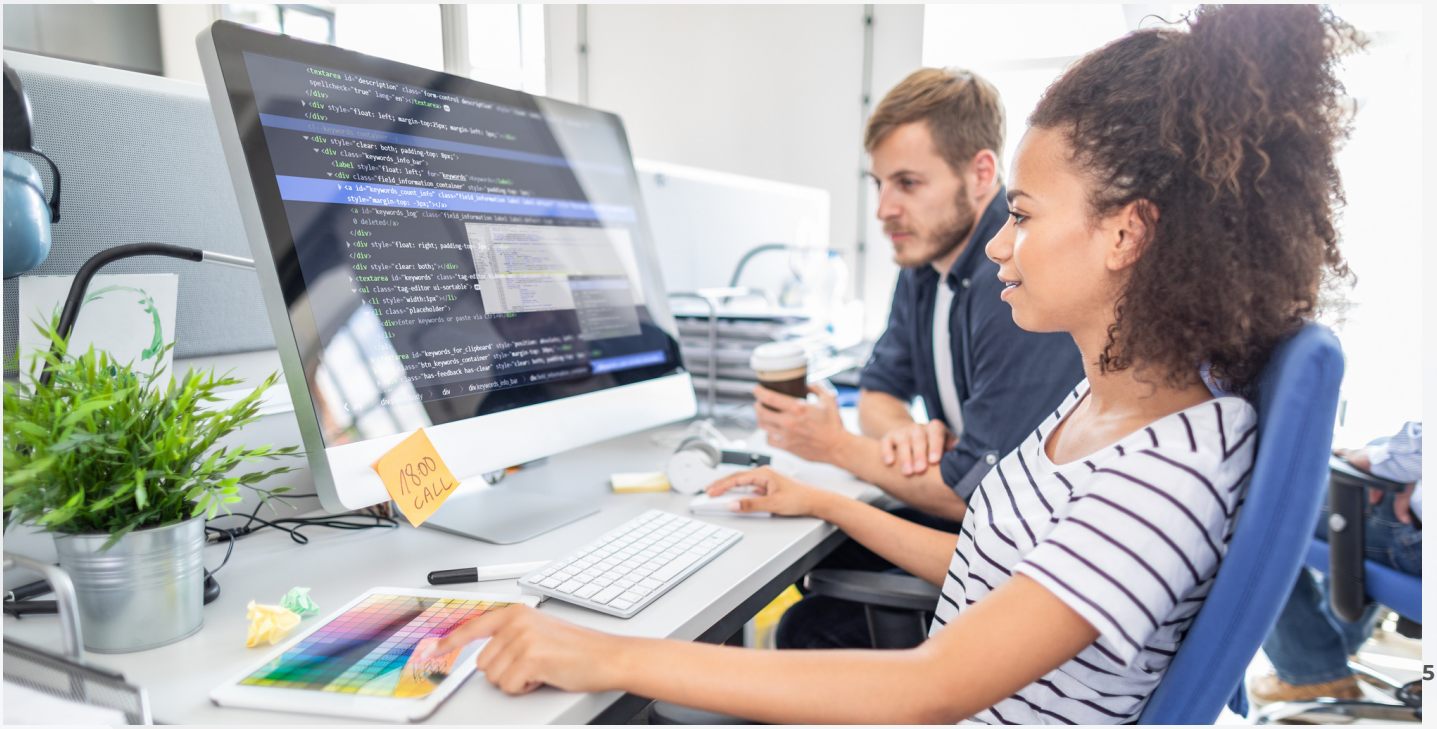
CORE LECTURES	Lectures at Groot Academy lay out the fundamentals of a topic. We focus on conveying the intentions behind different technologies in order to provide residents with a big-picture overview of the problems they solve and why they are important. After each lecture, residents dive into pair-programming to work through challenges, building full applications to cement their learning.
Data Structures, Algorithms, Time Complexity & Big-O Analysis, OOP & Functional Programming **Week 1 (Full-Time)** **Weeks 1–3 (Part-Time)**	**Data Structures** Residents understand and implement core data structures in computer science. **Algorithms** Residents develop algorithms to solve challenges in software engineering, including path-finding and searching. **Time Complexity and Big-O Analysis** Following the computer science standard of Big-O notation, residents optimize the design of their algorithms to make them more efficient with respect to processing time and memory used. **Object-Oriented and Functional Programming** two popular paradigms for structuring large applications. Residents dive into the prototype chain to learn more about pseudoclassical inheritance.
Front-End Fundamentals & React **Week 2 (Full-Time)** **Weeks 4–6 (Part-Time)**	**Front-End Fundamentals** Residents cover front-end design patterns, single page applications, and features (including Model-View-Controller and component-based design) while building their understanding of how DOM-manipulation works under the hood. Lectures explore common security vulnerabilities encountered by web applications in order to recognize patterns of common attacks. **React** Designed by Meta as a new way to build user interfaces, tech giants like Netflix, Airbnb, Paypal, and Twitter now use React for everything from websites to mobile applications and Smart TV interfaces. Residents become experts in React by building an in-depth understanding of fundamental front-end techniques and cutting-edge approaches to rendering user interfaces. Their under-the-hood knowledge of React means residents go on to be versatile software engineers.

Redux, UX, & Node **Week 3 (Full-Time)** **Weeks 7–9 (Part-Time)**	**Redux** Redux is a powerful predictable state container for JavaScript apps that works in harmony with React. Residents incorporate Redux into React applications. **UX** Responsiveness, performance, and accessibility are central to creating modern web pages. Residents implement UX best practices to optimize their applications. **Node** Node allows developers to create entire applications in a single language. Residents build full-stack applications by designing complex back-end architecture to connect with front-end logic. We teach Express, a back-end framework for Node, to further empower residents with what they can create.
Databases, Authentication, & Testing **Week 4 (Full-Time)** **Weeks 10–12 (Part-Time)**	**Databases** This unit covers relational and non-relational databases, including MongoDB and PostgreSQL. Residents design their database's schema and interact with it using raw SQL and ORMs. **Authentication and Authorization** To build a web app with users, engineers need to be able to securely and persistently log users in and out. Groot Academy teaches residents how to build a full authentication system using Express, bcrypt, and OAuth. **Testing** Residents learn the Test Driven Development process, making their code more maintainable, readable, and modular.



PROJECTS: SOLO, SCRATCH & ITERATION	Residents begin incorporating the tools they focused on in prior weeks to design full-stack web applications on their own and with cohort mates. Residents focus on Agile development cycles, using Scrum boards, and daily standups in order to work efficiently as part of an engineering team.
Solo, Scratch & Iteration Projects **Weeks 5-6 (Full-Time)** **Weeks 14–19 (Part-Time)**	**Solo Project** The first project of the Immersive program is also the only project residents do solo. By building a project from idea to functioning minimum viable product, residents cement the core curriculum while navigating the unknown. **Scratch Project** Working in groups, residents mentor each other in a professional team engineering setting. Residents build a project that challenges them technically and solves a problem they face as developers or consumers. **Iteration Project** With an aim of adding new features, improving code, and implementing engineering best practices, residents iterate on another group's existing scratch project. Residents get comfortable working with an established codebase and develop project management skills.

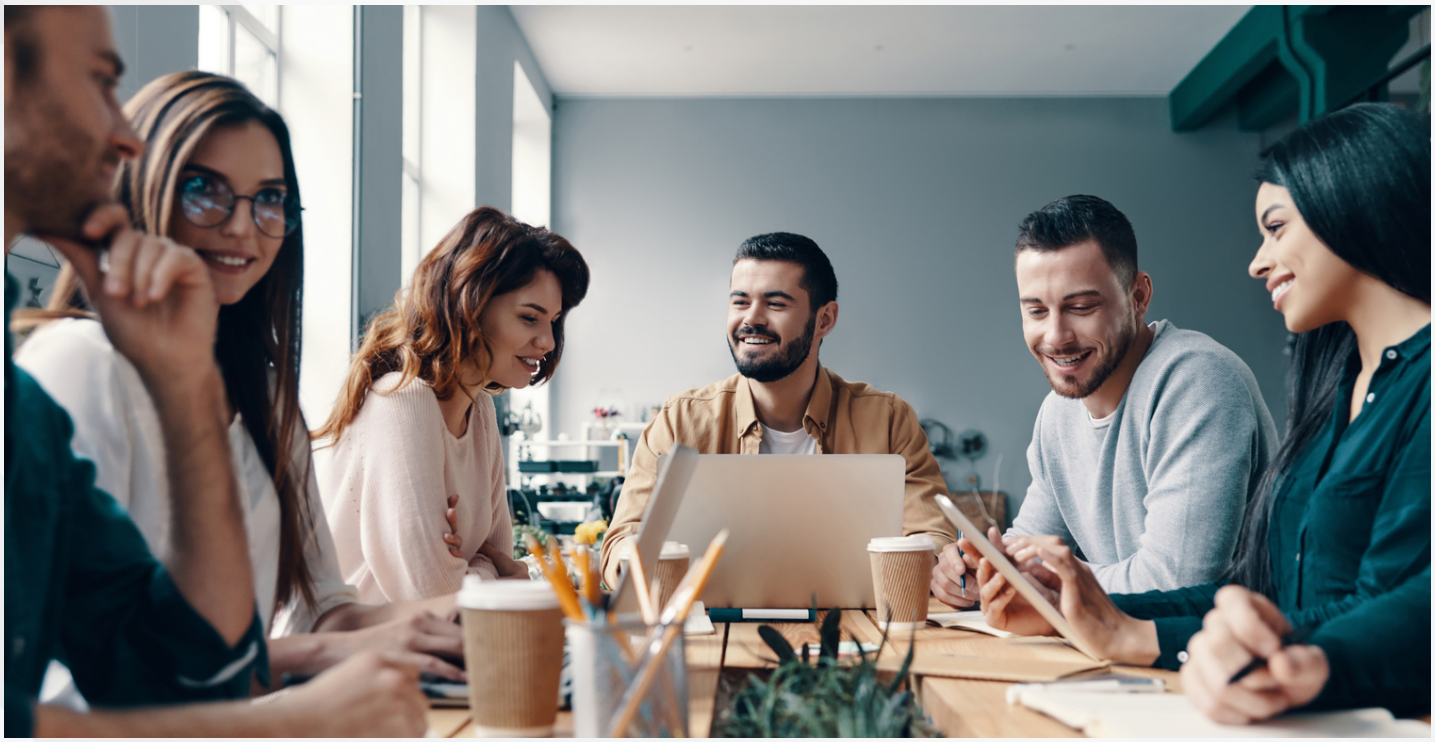
IDEATION WEEK	Ideation weeks give residents the opportunity to collaborate and brainstorm on ideas for their open source products.
Ideation **Ideation Week (Full-Time)** **Ideation Weeks (Part-Time)**	Between the Junior and Senior portions of the Immersive, residents meet in their open source product groups to ideate on the focus and outline of their project, conducting research to identify problem areas faced by the developer community. There are no scheduled lectures during this time.



OPEN SOURCE PRODUCT & REINFORCEMENT PROJECT	The senior portion of the program kicks project building into high gear. Residents work with a team to build challenging and compelling open source products. With the reinforcement project, residents bring their focus back to the core material around full-stack web applications.
Open Source Product **Weeks 7–10 (Full-Time)** **Weeks 23–32 (Part-Time)**	The open source product is the largest and most sophisticated project residents build during the program. While working on the open source product, residents sharpen their critical thinking, build their problem solving skills, and develop their autonomy as developers. The combination of direct job training on hard technologies and a supportive environment gives residents a unique experience that helps them stand out in their job search.
Reinforcement Project **Week 11 (Full-Time)** **Weeks 34–35 (Part-Time)**	With the reinforcement project, residents refresh their knowledge of core technologies before their job search. This project serves as an opportunity for implementing team and development best practices, and can be an additional project on residents' resumes.

ADVANCED LECTURES, HIRING PROGRAM, & MACHINE LEARNING	The second half of the program features advanced and professional-level lectures, covering topics such as DevOps, system design, front-end optimization, and machine learning. Then, the program's central focus shifts to the job search and interview preparation. Finally, the machine learning unit is an optional, post graduation immersive introduction to Python.
Advanced Lectures **Weeks 7–11 (Full-Time)** **Weeks 24–36 (Part-Time)**	**TypeScript** After having worked strictly in JavaScript during the junior portion, residents are introduced to TypeScript, a superset of the language that has become standard in the industry. We explore what TypeScript adds to JavaScript, its advantages, and what makes it so popular. **DevOps** In the DevOps unit, residents use Docker containers to examine and build the development and deployment ecosystem, enabling team collaboration in a shared environment. Instruction focuses on GitHub Actions' continuous integration and deployment platform, which pushes code up to a publicly accessible hosting environment configured on Amazon Web Services. **System Design** In preparation for system design questions that are becoming more prevalent in job interviews, residents step back and take a high-level view of pulling tools together to build a resilient, scalable system. **Design Patterns** Design patterns help address common architectural problems encountered when coding. We teach common patterns and how to speak about them to strengthen our residents' communication as engineers.

Hiring Program **Weeks 8–12 (Full-Time)** **Weeks 28–38 (Part-Time)**	**Resume Development** With the goal of communicating engineering ability to a non-technical audience, residents participate in three rounds of resume drafts and revisions with the Outcomes team. **Interview Prep** Residents participate in advanced technical interview workshops, white boarding exercises, and mock cultural interviews and phone screens in preparation for hiring. The hiring program also focuses on job search strategies, writing effective messages, and developing compelling online profiles. **Networking Day** Networking Day is an opportunity for soon-to-be-grads to connect with 2-3 Groot Academy alums who are actively working as software engineers at a variety of companies.
Machine Learning **Post Graduation (Optional)**	Residents gain familiarity with common machine learning and data science libraries, developing a deep understanding of the concepts used daily by Machine Learning Software Engineers. Groot Academy designed the Machine Learning unit to allow residents to build intelligent, data driven applications using Python.
Lifetime Career Support **Post Graduation**	Career support continues long after a resident's cohort ends, with grads returning for onsite check-ins and mock interviews. Even after landing their first role, if grads are looking to move positions or companies in the future, the Groot Academy team is always there to provide guidance and support. Career development never ends; even after graduation, residents are forever a part of our community.

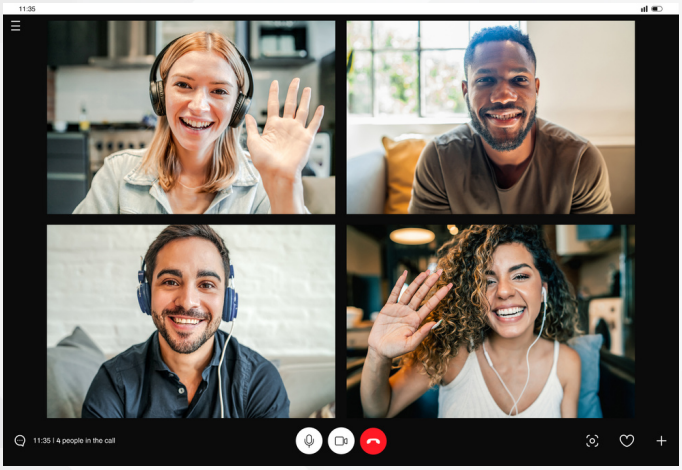


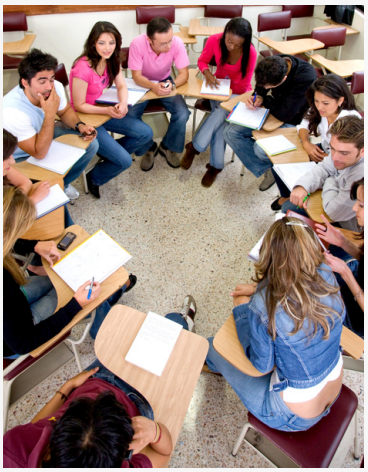
Groot Academy COMMUNITY

Groot Academy's community truly sets the program apart and provides a positive atmosphere where people can grow, succeed, and support each other. Social events and traditions are an integral part of the program.

In the first week of the program, we host a Welcome Lunch for the cohort and introduce the senior residents to the incoming junior residents. Thursdays are our social nights which create space for us to bond through friendly competition in a relay race, showcase unusual talents outside of coding at the Talent Show, and get creative at a Paint & Sip. We also host bi-weekly "Circles" which are 30-minute small group breaks designed for residents to connect with their cohort mates and get their minds off coding.

Our community is built on supporting and pushing each other to reach our goals. Each incoming junior resident gets matched with a senior resident, who acts as their mentor during the program. We host weekly mentor/mentee check-ins that allow for mentorship & relationship building. Each week the Groot Academy team and residents come together for Monday Night Family Dinner (Full-Time Immersives) or Thursday Shoutouts & Snacks (Part-Time Immersive). During these gatherings, everyone shares shoutouts to celebrate members of the community who went above and beyond to support others in the past week.





PROGRAM HIGHLIGHTS

LEARNING THROUGH BUILDING

Groot Academy's emphasis on creating open-source software and building products from the ground up provides residents with real-world problem-solving experience. This focus on building allows grads to form an under-the-hood understanding and develop the skill of technical decision-making, which sets them up for success in the job search.

BLOCK-DRIVEN DEVELOPMENT

Making mistakes and overcoming blocks is an essential part of learning. At Groot Academy, residents push themselves to face challenges head-on with a combination of thoughtful trial and error and effective research. You'll build a mental model for getting through blocks and develop the skills to tackle increasingly challenging problems.

PAIR PROGRAMMING AND TECHNICAL COMMUNICATION

Residents spend all but two days of the program working with other engineers to solve problems, build solutions, and debug their applications. Groot Academy emphasizes pair programming, a practice in which one engineer develops a strategy while the other translates it into working code. To move toward a solution, each engineer must be able to clearly communicate with the correct terminology and consider how to effectively connect with their partner. By developing technical communication skills, Groot Academy grads are poised to make meaningful contributions in the engineering community by serving as examples of
empathetic, collaborative excellence.

FIGHTING IMPOSTER SYNDROME WITH EMPATHETIC SUPPORT

Groot Academy is a challenging program with learners from various backgrounds. For many, facing those challenges can lead to doubting their abilities — otherwise known as imposter syndrome. We highlight the
importance of empathetic support and reinforce that in order to succeed, one must be kind to themselves and those around them. Residents focus on personal growth and avoid comparisons to other students' journeys. By openly discussing the topic and leaning on the community, our residents persevere through imposter syndrome.

SOFTWARE ENGINEERING IMMERSIVE ADMISSIONS

Each step of the Software Engineering Immersive admissions process evaluates candidates holistically across the capacities we've seen lead to success for Groot Academy graduates.

1. Online Application

The application includes essay questions and an optional coding challenge. The essay questions allow the Admissions team to evaluate your software engineering goals and why you believe Groot Academy's Immersive program is the ideal next step in your career. Take a look at our **upcoming start dates** to see which program and start date work best for you, and **visit our site to apply**.

2. Applicant Questionnaire

The questionnaire lets you share more about your background, including your career history, experience with tech, involvement in the Groot Academy community, and any potential accommodation requests, so the team can provide you with a customized admissions experience.

3. Initial Interview

The initial interview assesses your commitment to Groot Academy values, as well as your overall readiness and fit for the fast-paced, intense nature of the program. Criteria include motivation and determination, high aspiration, thoughtful communication, support of others, and alignment with the Immersive program's hard-learning instructional pedagogy.

4. Technical Interview

The technical interview evaluates your JavaScript and general programming knowledge, analytical problem-solving ability, engineering best practices, and both technical and non-technical communication to determine your ability to be successful in the Immersive program. An engineering fellow will assess these capacities as you work through a series of coding challenges, covering concepts like callbacks, closure, recursion, and object-oriented programming.

5. Admissions Decision

A Groot Academy team member will follow up to deliver your interview results, personalized
feedback, and next steps. You may be allowed up to three technical interview attempts, so do not be discouraged if you do not pass on your first try!

NOT SURE WHERE TO START?

Take a look at our **How to Prepare for the Groot Academy Technical Interview** guide. This guide provides a list of resources for applicants to build their coding skills in preparation for the Immersive program. If you have any questions about the syllabus, our programs, or anything else, **schedule a call** with one of our Alumni Advisors —they'll help you get started.

THE QUALITIES OF A GREAT ENGINEER

ANALYTICAL PROBLEM SOLVING

Software engineers solve new challenges every day. In our program, you'll develop the ability to break down complex challenges and create elegant solutions.

TECHNICAL COMMUNICATION

We ask our residents to consider: can someone else implement my approach from just my explanation? Being able to communicate their process through technical language with clarity and concision empowers our grads to enter the engineering workforce with the ability to communicate on a high level with their peers.

ENGINEERING BEST PRACTICES

How do you handle "not knowing," code structure, and reference to documentation? Do you demonstrate resilience through a block? By learning how to debug your code and research different approaches, you'll become an engineer who knows that any problem can be solved with a patient, thoughtful approach.

THOUGHTFUL COMMUNICATION

Applications are growing larger - and so are the teams who build them - so your day-to-day as an engineer will be very collaborative. Our residents work together every day, whether they're pair programming, giving feedback to one another, or building a project. This exposes you to a team environment and gives you an opportunity to expand your thoughtful and empathetic communication skills.

JAVASCRIPT AND PROGRAMMING KNOWLEDGE

We teach JavaScript because it's the most widely used programming language, and our under the hood approach gives you a deep understanding. Being fluent in one language sets the foundation for all future learning and growth. With your in-depth JavaScript knowledge, you'll be equipped to learn new languages with ease, making you a versatile and adaptive software engineer.

SOLVING REAL-WORLD PROBLEMS WITH CODE

Software engineers use code and technical problem-solving to create solutions to complex, real-world problems. Getting this hands-on experience of building with code allows Groot Academy applicants, residents, and grads to develop the skills of critical thinking, technical decision-making, and understanding of how different technologies work on a more practical level.