

Alignerr Lean Formalization Role – Required Skills & Learning Plan

Technical Skills Required for the Role

To excel in the Alignerr job posting (a **Mathematical Formalization Specialist / Lean 4 Proof Engineer** role), you need a strong set of technical and domain-specific skills. Based on the job description, key requirements include:

- **Expertise in Formal Proof Assistants (Lean preferred):** Hands-on experience with interactive theorem provers is crucial. The role explicitly seeks proficiency in **Lean 3 or Lean 4**, with Lean being “strongly preferred” ¹. Experience with similar proof assistants like Coq, Isabelle/HOL, or Agda is also valued ¹. In practice, this means you should be comfortable writing and verifying proofs in a formal language, using Lean’s syntax and tactics daily.
- **Strong Mathematical Proof and Reasoning Skills:** You must have a solid foundation in rigorous proof-writing and mathematical reasoning ². The job expects a graduate-level background in mathematics, logic, or theoretical computer science (e.g. a Master’s or higher) ². Experience with diverse areas of math (algebra, analysis, topology, logic, discrete math, etc.) is important to tackle a variety of proofs. In short, you should be adept at understanding complex mathematical arguments and translating them into formal proofs.
- **Formal Verification Enthusiasm and Knowledge:** A deep interest in **formal verification and mechanized mathematics** is essential ³. The role sits at the frontier of what formal proof systems can do, so being passionate about the future of proof assistants and AI in mathematics is important. Familiarity with concepts in **type theory** and the Curry–Howard correspondence, as well as experience with proof automation tools, are listed as “nice-to-have” skills ⁴. This implies that knowing how proofs correspond to programs and having some exposure to automated theorem-proving tactics or libraries will strengthen your profile.
- **Large-Scale Formalization & Math Libraries:** Experience contributing to or using large formalization projects (for example, Lean’s standard library **mathlib**) is a plus ⁵. This skill involves understanding existing formal proofs at scale and possibly extending them. If you have familiarity with mathlib or have formalized substantial proofs in any system, it will show you can handle the scale and collaboration needed for complex proof projects.
- **Data and AI Pipeline Experience (Secondary):** The Alignerr platform focuses on improving AI models via expert tasks, so experience with **data annotation, data quality, or evaluation systems** is mentioned as a preferred qualification ⁶. While not as central as formal proof skills, this hints that understanding how formalization might integrate into AI training workflows (for instance, ensuring high-integrity data or verifying model reasoning) is beneficial. General software engineering best practices (version control, reproducible workflows) will also help, given the need to produce “highly readable, reproducible proof scripts” ⁷.
- **Communication and Collaboration:** Though a soft skill, the technical role also demands strong communication abilities. You should be able to **explain formalization decisions and complex proofs in clear terms** ⁵. This means being comfortable discussing where proofs were challenging, how you resolved issues, and educating others (like AI researchers or engineers) about the formal proof process. Given that the role involves collaborating with researchers to improve verification pipelines ⁸, teamwork and clarity in technical communication are important technical-environment skills.

Self-Learning Plan to Build Lean Expertise (20 Hours/Week)

You've indicated that you meet all the requirements except for **Lean expertise**. Gaining competence in Lean 4 quickly is therefore the top priority. Below is a self-learning plan leveraging ~20 hours per week, focusing on free resources (with an option for paid certifications if useful). This plan is designed to make you comfortable with Lean in a matter of weeks so you can apply as soon as possible:

- Weeks 1–2: Master the Basics of Lean 4** – Dedicate the first two weeks to understanding Lean's core concepts and syntax. Start with *Theorem Proving in Lean 4*, the official free e-book/tutorial by the Lean community ⁹ ¹⁰. This resource introduces Lean's dependent type theory, how to write definitions and theorems, and basic proof tactics. As you work through it, practice inside VS Code with the Lean 4 extension (the Lean toolchain) ¹¹. Aim to spend ~10 hours per week reading and coding along in Lean. In parallel, engage with interactive learning: for example, try the **Natural Number Game** (an online game for Lean 3 that builds basic proof skills – still useful for fundamentals) or the newer Lean 4 Game if available. By the end of Week 2, you should be able to write simple proofs (e.g. prove basic properties of natural numbers or lists) and be familiar with Lean's environment and syntax.
- Weeks 3–4: Tackle Intermediate Proofs and Mathlib** – In the next two weeks, deepen your skills by formalizing more substantial proofs and exploring Lean's math library (**mathlib**). Use the resource *Mathematics in Lean* ¹², which focuses on formalizing typical undergraduate-level mathematics in Lean. Devote time to replicating proofs of theorems you know from your math background – for instance, try formalizing a result from real analysis or algebra that you're comfortable with on paper. This will teach you how to structure larger proofs and how to leverage mathlib's existing lemmas. Also, practice using Lean's tactic toolbox more fluently (e.g. induction, rewriting, contradiction, etc.). If you encounter difficulties, utilize the **Lean Zulip chat** community for help ¹³ – the Lean community is very responsive to beginners' questions. By Week 4, you should have completed several non-trivial proofs in Lean (for example, a proof by induction on a combinatorial identity or a simple correctness proof of an algorithm), building confidence in moving from "informal" to formal proofs.
- Weeks 5–6: Advanced Topics and Project Work** – If time permits before applying (another 2 weeks), tackle more advanced Lean topics and consider a small project to showcase your Lean ability. For example, learn about **metaprogramming in Lean 4** or proof automation tactics, which can set you apart (Lean 4 allows you to write custom tactics, leveraging your programming skills). A good exercise is to contribute in a minor way to Lean's mathlib on GitHub – perhaps find an elementary theorem that is missing or an existing proof that could be simplified, and submit a pull request. This experience will not only solidify your skills (and expose you to code review feedback from Lean experts) but also is something you can mention on your résumé to demonstrate real-world Lean usage. Additionally, explore any domain-specific formalization relevant to AI if possible – e.g., formalizing a known result in logic or computer science that might relate to AI reliability. Keep engaging with community resources: the Lean Zulip has channels for new members and for mathlib contributions where you can learn best practices. By the end of week 6, you should be comfortable reading others' Lean code and writing your own proofs for a variety of problems, which constitutes "Lean expertise" at a functional level.
- Learning Resources (Free and Paid) Summary:** Throughout this learning process, leverage free high-quality materials: the official Lean documentation and books (*Theorem Proving in Lean 4*, *Mathematics in Lean*) and the Lean community channels we mentioned. These cover everything from basic proof techniques to advanced uses of Lean ¹⁴ ¹³. For more interactive practice, use

the Lean online playgrounds or games (like the Lean Game Server that features proving challenges in linear algebra, e.g. the Cauchy-Schwarz inequality). If you prefer video or structured courses, you can supplement with related content – for example, the **Software Foundations** series (in Coq) or a Coursera course on formal verification principles – to reinforce concepts of formal logic and proofs. *(While there isn't a Lean-specific certification widely available yet, completing a formal methods MOOC could provide a certificate for your LinkedIn or resume. For instance, Coursera's Fundamentals of Model Checking specialization offers a shareable certificate ¹⁵. However, note that such courses focus on model checking and logic, not on Lean itself. They are optional and should be secondary to hands-on Lean practice.)* The priority is to demonstrate *practical* Lean skills through actual proof work rather than a certificate. Given 20 hours per week, this plan would make you conversant in Lean in roughly one to two months. If application deadlines are sooner, you can compress the timeline by increasing weekly hours or focusing on the core Lean prover training in steps 1 and 2, then noting in your application that you have been intensively training in Lean (backed up by a couple of small Lean projects in your portfolio).

Chances of Selection If You're Outside Five Eyes Countries

You also inquired about the likelihood of being selected if you **don't reside in a Five Eyes country**. (Five Eyes refers to the US, UK, Canada, Australia, New Zealand.) Alignerr is a U.S.-based platform, and some of its projects have geographic restrictions due to data security and compliance. Here's what our research indicates:

- **Geographical Restrictions Exist:** Alignerr's policies note that certain AI projects are **limited to specific regions**, and they enforce location verification (with government ID) for compliance ¹⁶. Using VPNs to fake location is banned, and your account could be paused if you try to work from a non-approved country ¹⁶. This suggests that if you reside outside the commonly approved regions, you might simply be ineligible for some projects. The exact list of "select regions" isn't published, but it likely includes Five Eyes countries and possibly EU countries for many projects, while excluding sanctioned or high-risk jurisdictions. France (where you are based) is not a Five Eyes member, but it is a Western country that may be acceptable for many projects – there's no evidence France is disallowed, though some projects might still prefer U.S./Canada for convenience or legal reasons.
- **Anecdotal Evidence from Other Alignerr Users:** According to one discussion, a user from France had **difficulty getting selected for missions** and wondered if most opportunities go strictly to U.S./Canada applicants ¹⁷. This implies there might be a bias or simply more competition if you're outside North America. However, others in the same discussion shared success stories: for example, a UK national living in France reported getting work on Alignerr with no issues (payments were processed to a French bank) ¹⁸. Another user mentioned being British in Southeast Asia and also getting accepted ¹⁹. This indicates that non-Five Eyes applicants *can* be selected, especially if they have the in-demand expertise, but they might face longer wait times or fewer available projects. The Alignerr community manager responded that project availability depends mostly on your domain skills and the pipeline of projects, not just on geography ²⁰.
- **Quantifying Your Chances:** It's hard to put a precise number on your selection probability, but it's fair to say it may be **slightly lower if you're outside the primary regions** (U.S./Canada). You might not benefit from any "home turf" advantage for U.S. projects, and time zone differences or legal constraints could reduce opportunities. That said, since this particular role requires niche expertise (Lean formalization) that few experts possess, your location could be less of a factor if you meet the skills. In other words, Alignerr and its clients are likely looking for the *best* formal proof specialists, not just the closest. If you present a strong profile demonstrating the required skills, your chances remain quite good. Being in France, which is a country with strong data

protection laws but also not on any prohibited list, you should still be competitive. In summary, you may face a somewhat smaller pool of projects, but **you are not disqualified** – many projects are fully remote and global. The key will be to **emphasize your rare skills** (Lean, formal proofs) to outweigh any minor geographic preference. Based on community input, you might expect the process to take a bit longer (perhaps a lower initial response rate), but with persistence and a standout application, you can absolutely succeed outside the Five Eyes.

Feedback on Your Résumé and Tailoring it for the Application

Finally, let's address your résumé (Matteo Cutrone's CV) and how to improve it for this specific Alignerr role. Your current résumé shows a strong engineering and applied mathematics background, which is a great foundation. To tailor it toward the **Lean formalization expert** position, consider the following adjustments:

- **Highlight Lean and Formal Proof Skills:** Since Lean expertise is the one area you're currently developing, make sure to add it visibly once you've started building some competency. For example, under your technical skills, include a line for **"Formal Verification Tools: Lean 4 (theorem prover) – currently training, Coq (familiar), etc."**. Even if you label Lean as "beginner" or "in progress," having it on your CV is crucial given that the job description emphasizes Lean experience ¹. You might also mention any self-driven Lean projects (even small ones) in your projects section. By the time you apply, you could list something like *"Formalized [a theorem or problem] in Lean 4 as part of self-study"* to showcase your new skill. This directly addresses the job's primary requirement and will catch the reviewer's eye.
- **Emphasize Your Mathematical Proof Background:** Your résumé already contains a strong academic background in math (e.g., **Cours Préparatoires** with courses in Algebraic Structures, Topology, Real Analysis, etc., and a Master-level coursework in Applied Mathematics) ²¹ ²². Make sure the relevance of this background is clear. The job demands the ability to write rigorous proofs and a deep understanding of mathematics ². You may want to add a brief phrase in your profile or education section to explicitly state your experience with formal mathematics and proof-writing. For instance, **"Strong foundation in rigorous proof techniques** from advanced coursework in mathematics (Topology, Abstract Algebra, Real Analysis) during engineering studies." This will reassure employers that you have the theoretical muscle for formal proofs. If you wrote a thesis or did any research involving proofs, highlight that as well.
- **Include Relevant Projects (Formal Methods/Logic):** In your list of projects and experiences, bring any formal methods or logic-related work to the forefront. For example, you listed a personal project "Grace: Formal Requirements Engineering" which uses controlled natural language to bridge to formal logic ²³. This is highly relevant experience – it shows you have interest in formalizing language and logic. Expand on this in your résumé bullet: explain briefly that it involved formal logic or verification of requirements. You could write something like *"Developed an LLM-assisted framework that transforms user stories into formal specifications (using controlled natural language tied to logic), ensuring consistency and completeness."* Even though this isn't using Lean, it demonstrates your drive to apply formal rigor, which aligns with the Alignerr role's ethos. If you have any other experience with formal verification (e.g., maybe using a model checker or writing invariants for a system), make sure to include it. If not, consider adding a small self-driven project as mentioned (like a mini Lean formalization project) to this section.
- **Showcase Communication and Collaboration Skills:** The job description values strong communication in explaining complex proofs ⁵. You can tailor your résumé to reflect this by mentioning instances where you communicated or led technically complex efforts. In your education section, you note you *"Organized conferences with industrial partners"* during your engineering degree ²⁴ – this is a good example of communication and leadership. Ensure this stays in and is visible. Also, if you served as a **student representative** (as hinted in your résumé)

or mentored anyone, include that. In your professional experience, if you have examples of writing documentation, giving presentations (perhaps you presented the results of your Dassault Aviation internship to stakeholders), or cross-disciplinary collaboration, consider adding a bullet point under those roles to illustrate it. For instance, under your Systems Engineer roles, you might add *"Liaised between engineers and project stakeholders to ensure mathematical correctness of requirements"* (if applicable). The goal is to demonstrate that you can articulate technical concepts clearly – a trait that will be useful when discussing formal proofs with non-specialists.

- **Tailor the Focus – Math and Formal over General Engineering:** While your experience in aerospace and systems engineering is impressive, for this particular application you might downplay details that aren't relevant to formal proof or AI. You don't need to remove them (they show you're well-rounded), but consider *brevity* for, say, the drone hackathon or the combat helicopter internship, and use the space to elaborate more on mathematically intensive tasks. For example, the bullet about delivering a mathematical optimization model for a startup (as a freelance consultant) is worth keeping since it underscores mathematical problem-solving. But the one about an Excel dashboard for a certifying authority might be less relevant here and could be shortened or omitted in favor of highlighting, say, a proof-of-concept you did with some algorithm. Reordering is another strategy: you could list personal projects or education (which are more aligned with formal math) before some of the less relevant work experiences so that a recruiter skimming the CV sees the most pertinent info first. Also, if you have space, adding a one-line **Objective or Summary** at the top stating your interest in formal methods/AI safety could frame your diverse experience in context. For example: *"Systems Engineer with a robust mathematics background seeking to apply formal proof skills (Lean, formal verification) to advance AI model reliability."* This kind of statement can immediately tailor the résumé to the Alignerr role.

- **Finalize with Lean-Ready Confidence:** Once you've implemented the above changes, your résumé should convey a narrative that **you are a mathematician/engineer hybrid who is diving into formal proofs and Lean**. It will show that aside from meeting the other requirements (programming, data, etc.), you have taken concrete steps to acquire Lean proficiency. Any evidence of quick self-learning (like certificates or self-driven projects) can be briefly mentioned to demonstrate your ability to pick up new technical skills rapidly – a plus for being an Alignerr "expert." Given that the position is contract-based and remote, also be sure your resume or cover letter highlights your availability and motivation: e.g. "available to work ~20 hours/week on contract basis" (if that's what you intend initially) and your enthusiasm for the mission of Alignerr (improving AI through expert input). While not a résumé content point, don't forget to update your **LinkedIn** similarly, since Alignerr might view that, and possibly include any Lean or formal methods keywords there as well.

By implementing these changes, you'll tailor your default CV into a targeted application that showcases the technical skills Alignerr is looking for and addresses the Lean expertise gap proactively. With your strong background and the new Lean skills you'll have developed, you should be a compelling candidate for the role. Good luck with your application!

Sources: The job requirements and role expectations were based on Alignerr's job posting for a Lean-focused formalization specialist ² ⁵ and related listings ²⁵ ⁶. Learning plan resources are drawn from the official Lean community documentation ¹⁴ ¹³. Information on geographic considerations comes from Alignerr's policies ¹⁶ and user discussions about Alignerr's regional selection experiences ¹⁷ ¹⁸.

1 2 3 4 5 8 **Alignerr hiring Lean 4 Mathematical Formalization Expert (Contract) - Remote in San Francisco, CA | LinkedIn**

<https://www.linkedin.com/jobs/view/lean-4-mathematical-formalization-expert-contract-remote-at-alignerr-4359887876>

6 7 25 **Applied Formal Methods Researcher (Lean 4) @ Alignerr | Jobright.ai**

<https://jobright.ai/jobs/info/69546899f1f8465b79eb8ef9>

9 11 **Theorem Proving in Lean 4**

https://leanprover.github.io/theorem_proving_in_lean4/

10 12 13 14 **An Introduction to Lean 4**

<https://www.uv.es/cosilloen/Lean4/>

15 **Introduction to Modeling for Formal Verification | Coursera**

<https://www.coursera.org/learn/introduction-to-modeling-for-formal-verification>

16 **Alignerr Working Location Policy 2024 - bc3465 | PDF**

<https://www.scribd.com/document/819093284/Alignerr-Working-Location-Policy-2024-bc3465>

17 18 19 20 **Any non-US/Canada people getting accepted for Alignerr missions? : r/alignerr**

https://www.reddit.com/r/alignerr/comments/1p6hmcl/any_nonuscanada_people_getting_accepted_for/

21 22 23 24 **CV_MATTEO_CUTRONE.pdf**

file:///file_0000000089c8722faa306a536d1d8075