Section 0: Introduction

6 Lectures:

- **Learn To Work With LLMs with Scott Kerr:** Course welcome and a high-level overview.
- **Course Introduction:** Explanation of course format, who it's for, and what to expect.
- **Course Resources + Handbook:** Links to PDF handbooks, useful guides, and supplementary materials.
- **Exercise: Meet Your Classmates and Instructor:** Interactive introduction activity with the Discord/ZTM Community.
- **ZTM Plugin + Understanding Your Video Player:** How to use the ZTM platform, plugins, and video tools.
- **Set Your Learning Streak Goal:** Encouragement to set progress targets for accountability.

Section 1: Introduction to Prompt Engineering

9 Lectures:

- Definition and importance of prompt engineering.
- Why prompt engineering exists.
- Real-world applications and impact.
- Case studies (e.g., NASA).
- The relevance of prompt engineering to different roles/careers.
- The evolution of prompting.
- The future of prompting in the context of AI.
- Critical thinking exercise: Assess where prompt engineering fits in your life/work.
- Discussion on current debates in the field.

Section 2: Choose Your LLM

5 Lectures:

- Overview of major LLMs (GPT-4o, Claude, Llama).
- Paid vs. free LLM options.
- Tool demonstrations (e.g., OpenAI Playground).

- Multimodal capabilities of some LLMs.
- Setting up your workspace (option to use open-source LLMs).

Section 3: Guided Project – Build Your First Game (Snake Game)

9 Lectures:

- Why build with LLMs: hands-on learning.
- Setting up project expectations.
- Planning and basic code structure for Snake.
- Prompting LLM to generate code.
- Iterative debugging with LLM assistance.
- Customizing gameplay and features.
- Best practices for interactive LLM use.
- Documenting and testing results.
- Wrap-up and sharing your build.

Section 4: How LLMs Work

16 Lectures:

- "Word guessing machine" concept.
- What the Transformer architecture is and how it operates.
- GPT model internals.
- Fine-tuned vs. base LLMs.
- What "tokens" are and how they work.
- Data, training, and inference process.
- How LLMs "think" (limitations and strengths).
- Myths and misconceptions about LLMs.
- Visualization exercises for model architecture.
- AI capabilities vs. AGI (Artificial General Intelligence).
- LLM reliability and risk analysis.
- Discussion of advanced model variants.
- Practical exercises: Simulating a "token sequence."
- Research behind LLMs.

- AGI debates and real-world opinions.
- LLMs' impact on AI research direction.

Section 5: Challenge – Build Your Second Game (Tic Tac Toe w/ AI opponent)

1 Lecture:

- Instructions for a solo, unguided project: Use any LLM to build a playable Tic-Tac-Toe game with an AI bot.

Section 6: Our Prompting Framework

4 Lectures:

- Introduction to structured prompting (the ZTM framework).
- Prompt Library: Ready-made prompt examples.
- How to analyze and adjust prompts for optimal results.
- Applying the framework to real tasks.

Section 7: Prompting Fundamentals – The Setup

23 Lectures:

- Role of the system message.
- Context management in prompts.
- Using personas/roles to affect LLM outputs.
- Style, tone, and voice techniques.
- Methods for guiding conversational "flow."
- Keeping prompts focused and on-topic.
- Handling multi-turn dialogue scenarios.
- Security and confidentiality best practices.
- Prompts for content generation vs. instruction.
- Case studies and practice exercises (e.g., write a screenplay).

- Limits of LLM confidentiality.
- Working with unclear/incomplete information.
- LLM memory simulation.
- Bias handling.
- Prompting for structured data.
- Error handlings and fallback prompts.
- Techniques for iterative prompt improvement.
- Experimenting with chaining prompts.
- Maintaining and expanding prompt libraries.
- User role simulation and creative variations.
- Team collaboration in prompt design.
- Prompting for multiple output types.
- Managing and updating prompt documentation.

Section 8: Prompting Fundamentals – The Instruction

17 Lectures:

- Writing effective end-user (user) messages.
- Clarity and specificity principles.
- Use of delimiters and other structuring tricks.
- Template-based instructions.
- Handling ambiguity.
- Prompting for sequential tasks.
- Overcoming human (asking) limitations.
- How to use zero-, one-, and few-shot prompting.
- Chain-of-thought prompting for deeper outputs.
- Context expansion techniques.
- Handling multiple instructions or objectives.
- Error analysis and self-improvement prompts.
- Code generation instruction patterns.
- Advanced chaining for complex problem-solving.
- Empirical evidence from research on instructions.
- Real-world demonstration exercises.
- Prompt debugging exercises.

Section 9: Guided Project – Create Your Own Career Coach

8 Lectures:

- Planning and requirements gathering for Career Coach prompt.
- Ideation: Core "modes" (learning, quiz, challenge).
- Feynman Teaching Mode prompt structure.
- Quiz Generator mode structure and customization.
- Coding Challenge mode, XP points, and gamification.
- Feedback and self-assessment instructions.
- Testing and refinement.
- Final deployment and usage tips.

Section 10: Prompting Fundamentals – The Output

5 Lectures:

- Controlling response length.
- Formatting outputs (tables, lists, Excel, flowcharts, etc.).
- Exercises in formatting structured LLM output.
- Jailbreaking and prompt injection vulnerabilities.
- Exploration of prompt "hacks" and their risks/rewards.

Section 11: The Dark Side of AI (Guardrails, Jailbreaks, Injections, Hallucinations + more)

20 Lectures:

- Understanding LLM safety and "guardrails."
- Jailbreaking: What it is and how it works.
- Prompt Injection attacks in depth.
- Hallucinations: Causes and prevention strategies.
- Real-world cases of LLM misuse.
- Defensive prompting.
- Security research in LLMs.

- Preventing prompt leakage.
- How LLMs filter and moderate outputs.
- Limitations of platform-admin controls.
- Red-teaming exercises.
- Best practices for secure prompt engineering.
- Regulatory overview for LLM safety.
- Advanced ethical concerns.
- Data governance and privacy handling.
- Fairness and anti-bias in prompts.
- Evaluating LLM output for safety.
- Group exercise: "Attack and defend" prompts.
- Reporting security issues.
- Resources for further risk management learning.

Section 12: LLM Hyperparameters & The OpenAI Playground

6 Lectures:

- OpenAI Playground fundamentals.
- Practical walkthroughs for Playground experiments.
- Explanation of hyperparameters (Temperature, Top P).
- Frequency and presence penalty impact.
- Using stop sequences for output control.
- Tuning parameters for better/safer LLM responses.

Section 13: ChatGPT Deep Dive (Multi-Modality, Tools and more)

16 Lectures:

- What is multi-modality (text, images, audio, video inputs)?
- How ChatGPT uses plugins and optional tools.
- System integration with external APIs.
- Vision and voice models in prompt engineering.

- Combining structured and unstructured outputs.
- Advanced ChatGPT features (functions, memory).
- Prompting for brainstorming/creative applications.
- Automation with ChatGPT.
- Integrating ChatGPT into your workflows/projects.
- Security considerations and sandboxing.
- Multi-modal prompting challenges.
- Use cases for each modality.
- Output control and validation exercises.
- Plug-in marketplace insights.
- Community demo walkthroughs.
- Future directions for ChatGPT and similar models.

Section 14: Open Source Models

11 Lectures:

- What are open-source LLMs?
- Closed vs. open-source LLM comparison.
- Using Chatbot Arena Leaderboard.
- Rapid review of top open-source models.
- Privacy and security benefits of local LLMs.
- Practical: Using LMStudio to set up LLM locally.
- Prompting with local and cloud LLMs.
- Model download and deployment walkthrough.
- "Guardrails" for open-source LLMs.
- Prompting for unrestricted research/development.
- Best practices for contributing to open-source LLMs.

Section 15: Advanced Prompting Techniques

24 Lectures:

- Step-by-step instructions for advanced techniques.
- Research-based advanced prompting (papers included).
- Tree-of-thought, Least-to-most, and many others.

- Chain-of-execution.
- Self-reflection prompts.
- Fact-checking with LLMs.
- Meta-prompting (prompts that generate prompts).
- Dynamic template generation.
- Running experiments with prompt variants.
- Custom scoring and evaluation metrics for prompts.
- Combining advanced techniques.
- Iterative prompt development cycle.
- Data processing with prompt chains.
- Prompt optimization hacks.
- Prompt anonymization techniques.
- Evaluating prompt ROI (efficiency, performance).
- Open challenge: Suggest new advanced techniques.
- Research paper discussion groups.
- Updating and expanding your Prompt Library.
- Automating prompt testing.
- Creating reusable prompt modules.
- Building prompt "systems" for organizations.
- Prompt sharing and collaboration tools.
- Guest lectures on bleeding-edge methods.

Section 16: Challenge – Build Your Third Game (Flappy Bird)

2 Lectures:

- Solo or paired project: Flappy Bird with LLM-generated code.
- Guidance on multi-iteration prompting and debugging.

Section 17: Prompt Testing and Model Benchmarks

17 Lectures:

- Methods for prompt testing: manual, automated, crowdsourced.
- Grading and validation: code-based, human, model-based grading.

- Research on LLMs as "judges."
- Tool-based prompt evaluation.
- Statistical analysis of prompt performance.
- Managing prompt tests at scale.
- Model benchmark standards.
- Error and accuracy reporting.
- Blind tests and A/B test strategies.
- Gathering and utilizing feedback.
- Code walkthroughs: Setting up prompt tests.
- Optimization exercises.
- Field reports from practitioners.
- Open-source tools and libraries for evaluation.
- Group exercise: Design benchmark tests.
- Discussion: Model improvement through testing.
- Maintenance and documentation of prompt test suites.

Section 18: Applied Prompt Engineering – Developing Prompt Tests & Evaluations with PromptFoo

20 Lectures:

- Introduction to PromptFoo for prompt test automation.
- Setting up prompt test environments.
- Customizing evaluations for context, format, and style.
- Coding and prompt integration.
- Use cases for PromptFoo in organizations.
- Building prompt regression tests.
- Real-world case studies and demo walkthroughs.
- Best practices for applied prompt engineering.
- Creating prompt test dashboards.
- Collaboration and sharing with teams.
- Continuous integration with prompt development.
- Interactive problem-solving exercises.
- Maintenance and reporting for prompt evaluations.
- Critical assessment of real-world prompt failures.
- Integrating with model versioning.
- Scenario-based evaluations.

- Metric tracking, visualization, and reporting.
- Group challenge: Build a prompt evaluation plan.
- Wrap-up and next steps for applied testing.

Section 19: Challenge – Become an AI Researcher! (Develop Your Own Prompting Technique)

1 Lecture:

- Capstone challenge: Propose, develop, and test your unique prompting approach—document process, share with community.

Section 20: AI Research and the Quest for Artificial General Intelligence

10 Lectures:

- AGI: What is it? Progress update and predictions.
- LLMs and the path to AGI.
- Key research milestones.
- Implications of AGI for humanity.
- Theoretical underpinnings of AGI.
- Debates and controversies.
- Interview/roundtable with experts.
- Book/paper recommendations for further research.
- Critical thinking exercises.
- How to stay updated and join the AI research movement.

If you want details for the bonus/appendix section ("Prompting with Autonomous Agents"), let me know!