| **Topic** | **Resources** | **Mini Exercises / Tasks** | **FAANG Focus** |
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| **Python & FastAPI Basics** | FastAPI docs, “Effective Python” | Create /ping endpoint, test in browser/Postman | Clear understanding of routing, DI, async vs sync |
| **Pydantic Models** | Pydantic docs | Create UserCreate & UserOut models, add validation, test with FastAPI | Data validation & serialization |
| **Database & ORM** | SQLAlchemy docs, tutorials | Define User model, create SQLite DB, test CRUD | ORM modeling, session handling, query filtering |
| **Migrations** | Alembic docs | Add Alembic to project, create initial migration, apply to DB | Database versioning, schema management |
| **Authentication** | Passlib docs, JWT tutorials | Implement /auth/register and /auth/login with JWT | Security, token-based auth, route protection |
| **Error Handling** | FastAPI Exception docs | Raise HTTPException for duplicate email, invalid login | Proper error reporting & UX |
| **Routers & Modular Code** | FastAPI docs | Move auth endpoints into auth.py router | Clean, maintainable, modular architecture |
| **Testing (Backend)** | pytest docs | Write unit tests for /auth/register | Testable, reliable code |
| **Relationships** | SQLAlchemy docs | Add Appointment table linked to User | Design scalable relational DB structure |
| **CRUD Endpoints** | FastAPI tutorials | Implement CRUD for appointments & reviews | Full REST API design |
| **Background Tasks** | FastAPI docs | Add welcome email simulation using BackgroundTasks | Async task handling |
| **Frontend Integration** | React docs, Axios | Build React form to call /auth/register & /auth/login | End-to-end integration |
| **Deployment & Docker** | Docker + Uvicorn + FastAPI guides | Dockerize backend, run locally in container | Production-readiness |
| **Cloud Deployment** | Render, Railway, AWS docs | Deploy backend to cloud, connect DB | Real-world deployment & scalability |
| **Monitoring & Logging** | Python logging, Sentry docs | Add logging for all endpoints | Observability & debugging in production |
| **Advanced / Optional** | SQLAlchemy async, Redis, WebSockets | Async endpoints, caching appointments, real-time notifications | High-performance backend patterns |