

Python Packages Reference

Essential Packages for Python Development

Web Development & HTTP

Package	Install	Description	Key Features
requests	pip install requests	HTTP library for humans	GET/POST requests, sessions, auth, timeouts, JSON support
httpx	pip install httpx	Modern HTTP client	Async support, HTTP/2, same API as requests
flask	pip install flask	Micro web framework	Lightweight, routing, templates, extensions, REST APIs
django	pip install django	Full-stack framework	ORM, admin panel, auth, forms, templates, migrations
fastapi	pip install fastapi	Modern async API framework	Auto docs, validation, type hints, WebSocket, dependencies
aiohttp	pip install aiohttp	Async HTTP client/server	Async/await, WebSocket, client sessions
urllib3	pip install urllib3	HTTP client (lower level)	Connection pooling, retries, redirects
tornado	pip install tornado	Async web framework	WebSocket, long polling, non-blocking I/O

Data Science & Machine Learning

Package	Install	Description	Key Features
numpy	pip install numpy	Numerical computing	Arrays, linear algebra, FFT, random numbers
pandas	pip install pandas	Data manipulation	DataFrames, CSV/Excel I/O, groupby, merge, time series
scipy	pip install scipy	Scientific computing	Optimization, integration, interpolation, signal processing
matplotlib	pip install matplotlib	Plotting library	Line/bar/scatter plots, subplots, customization
seaborn	pip install seaborn	Statistical visualization	Beautiful plots, heatmaps, distributions, themes
plotly	pip install plotly	Interactive plots	Web-based, 3D plots, dashboards, animations
scikit-learn	pip install scikit-learn	Machine learning	Classification, regression, clustering, pipelines, metrics
tensorflow	pip install tensorflow	Deep learning	Neural networks, GPU support, Keras API, production
pytorch	pip install torch	Deep learning	Dynamic graphs, GPU, research-friendly, torchvision
keras	pip install keras	High-level neural nets	Simple API, quick prototyping, multiple backends

Database & ORM

Package	Install	Description	Key Features
sqlalchemy	pip install sqlalchemy	SQL toolkit & ORM	Connection pooling, ORM, query builder, migrations
psycopg2	pip install psycopg2-binary	PostgreSQL adapter	Fast, reliable, full PostgreSQL support
pymysql	pip install pymysql	MySQL client	Pure Python, drop-in replacement for MySQLdb
pymongo	pip install pymongo	MongoDB driver	CRUD operations, aggregation, GridFS
redis	pip install redis	Redis client	Caching, pub/sub, transactions, pipelines
elasticsearch	pip install elasticsearch	Elasticsearch client	Full-text search, bulk operations, helpers
peewee	pip install peewee	Simple ORM	Lightweight, expressive, easy to learn
tortoise-orm	pip install tortoise-orm	Async ORM	Django-like API, async/await, migrations

Web Scraping & Automation

Package	Install	Description	Key Features
beautifulsoup4	pip install beautifulsoup4	HTML/XML parser	Easy navigation, search, modify DOM, multiple parsers
lxml	pip install lxml	Fast XML/HTML parser	XPath, XSLT, high performance, C libraries
scrapy	pip install scrapy	Web scraping framework	Spiders, pipelines, middleware, async, export
selenium	pip install selenium	Browser automation	JavaScript support, full browser control, testing
playwright	pip install playwright	Modern browser automation	Async, multiple browsers, screenshots, recordings
puppeteer	pip install puppeteer	Headless Chrome	Async, JavaScript rendering, PDF generation

Testing & Quality Assurance

Package	Install	Description	Key Features
pytest	pip install pytest	Testing framework	Fixtures, parametrize, plugins, assertions, coverage
unittest	Built-in	Unit testing framework	TestCase, setUp/tearDown, assertions, mocking
coverage	pip install coverage	Code coverage	Line coverage, branch coverage, HTML reports
tox	pip install tox	Test automation	Multiple environments, CI/CD, matrix testing
black	pip install black	Code formatter	Opinionated, fast, deterministic, PEP 8 compliant
pylint	pip install pylint	Code linter	Error detection, refactoring hints, customizable
flake8	pip install flake8	Style checker	PEP 8, complexity, plugins
mypy	pip install mypy	Static type checker	Type hints validation, gradual typing
bandit	pip install bandit	Security linter	Find security issues, SQL injection, hardcoded passwords

CLI & Terminal

Package	Install	Description	Key Features
click	pip install click	CLI creation framework	Commands, options, arguments, nested, colors
argparse	Built-in	Argument parser	Positional args, options, subcommands, help
rich	pip install rich	Rich terminal output	Colors, tables, progress, syntax highlighting, markdown
colorama	pip install colorama	Cross-platform colors	ANSI colors on Windows, simple API
tqdm	pip install tqdm	Progress bars	Fast, extensible, pandas integration, nested
prompt_toolkit	pip install prompt_toolkit	Interactive CLIs	Auto-completion, syntax highlight, history
typer	pip install typer	Modern CLI (Click-based)	Type hints, auto docs, validation

File Formats & Data Processing

Package	Install	Description	Key Features
openpyxl	pip install openpyxl	Excel files (xlsx)	Read/write, formulas, styles, charts
xlrd/xlwt	pip install xlrd xlwt	Excel (xls) legacy	Old Excel format, simple API
python-docx	pip install python-docx	Word documents	Create/modify .docx, paragraphs, tables, images
pypdf	pip install pypdf	PDF manipulation	Merge, split, rotate, extract text
reportlab	pip install reportlab	PDF generation	Create PDFs, graphics, tables, barcodes
pillow	pip install pillow	Image processing	Open/save, resize, crop, filters, drawing
pyyaml	pip install pyyaml	YAML parser	Load/dump, safe loading, custom tags
toml	pip install toml	TOML parser	Config files, simple format
xmltodict	pip install xmltodict	XML to dict	Easy XML parsing, bidirectional

Async & Concurrency

Package	Install	Description	Key Features
asyncio	Built-in	Async I/O	Coroutines, tasks, event loop, streams
celery	pip install celery	Distributed task queue	Background jobs, scheduling, retries, monitoring
rq	pip install rq	Simple job queue	Redis-based, lightweight, dashboard
gevent	pip install gevent	Coroutine-based	Greenlets, monkey patching, networking
concurrent.futures	Built-in	Thread/process pools	Executor interface, futures, map

API Development & Serialization

Package	Install	Description	Key Features
pydantic	pip install pydantic	Data validation	Type hints, parsing, validation, settings
marshmallow	pip install marshmallow	Serialization	Schema, validation, deserialization, nesting
graphene	pip install graphene	GraphQL framework	Schema, queries, mutations, subscriptions
grpcio	pip install grpcio	gRPC framework	RPC, protobuf, streaming, async
jsonschema	pip install jsonschema	JSON Schema validation	Draft validation, custom formats
msgpack	pip install msgpack	Fast serialization	Binary format, faster than JSON, compact

Security & Authentication

Package	Install	Description	Key Features
cryptography	pip install cryptography	Cryptographic recipes	Encryption, hashing, certificates, keys
pyjwt	pip install pyjwt	JSON Web Tokens	Encode/decode JWT, algorithms, claims
passlib	pip install passlib	Password hashing	Multiple algorithms, bcrypt, verification
python-jose	pip install python-jose	JOSE implementation	JWS, JWE, JWK, JWT
oauthlib	pip install oauthlib	OAuth framework	OAuth 1.0/2.0, providers, clients
authlib	pip install authlib	Auth library	OAuth, OpenID, JWT, clients/servers

DevOps & Cloud

Package	Install	Description	Key Features
boto3	pip install boto3	AWS SDK	S3, EC2, Lambda, DynamoDB, comprehensive coverage
google-cloud	pip install google-cloud	*Google Cloud SDK	Storage, Compute, BigQuery, AI services
azure-*	pip install azure-*	Azure SDK	Storage, Compute, AI, comprehensive services
docker	pip install docker	Docker SDK	Container management, images, networks, volumes
kubernetes	pip install kubernetes	Kubernetes client	API access, deployments, services, pods
fabric	pip install fabric	Remote execution	SSH, deployment, automation
ansible	pip install ansible	Automation tool	Configuration, deployment, orchestration

Utilities & Tools

Package	Install	Description	Key Features
python-dotenv	pip install python-dotenv	Environment variables	Load .env files, configuration
pendulum	pip install pendulum	Better datetime	Timezone handling, human-readable, parsing
arrow	pip install arrow	Better dates/times	Simple API, timezone aware, humanization
python-dateutil	pip install python-dateutil	Date utilities	Parsing, relative deltas, timezone
schedule	pip install schedule	Job scheduling	Cron-like, simple API, human-readable
faker	pip install faker	Fake data generation	Names, addresses, text, localization
pythonSlugify	pip install pythonslugify	URL slugs	Convert text to URL-safe strings
validators	pip install validators	Data validation	Email, URL, IP, credit card validation
phonenumbers	pip install phonenumbers	Phone number parsing	Validation, formatting, geocoding

Natural Language Processing

Package	Install	Description	Key Features
nltk	pip install nltk	NLP toolkit	Tokenization, tagging, parsing, corpora
spacy	pip install spacy	Industrial NLP	Fast, pre-trained models, entities, vectors
transformers	pip install transformers	Transformer models	BERT, GPT, pre-trained, fine-tuning
gensim	pip install gensim	Topic modeling	Word2Vec, Doc2Vec, LDA, similarity
textblob	pip install textblob	Simple NLP	Sentiment, translation, easy API

Logging & Monitoring

Package	Install	Description	Key Features
loguru	pip install loguru	Easy logging	Simple API, colors, rotation, formatting
sentry-sdk	pip install sentry-sdk	Error tracking	Crash reports, breadcrumbs, integrations
prometheus_client	pip install prometheus_client	Metrics	Counters, gauges, histograms, export
statsd	pip install statsd	StatsD client	Metrics, counters, timing

Specialized Packages

Package	Install	Description	Key Features
opencv-python	pip install opencv-python	Computer vision	Image processing, video, object detection, features
tensorflow-hub	pip install tensorflow-hub	Pre-trained models	Transfer learning, embeddings, classification
librosa	pip install librosa	Audio analysis	Feature extraction, spectrograms, tempo, pitch
openai	pip install openai	OpenAI API	GPT models, embeddings, completions
anthropic	pip install anthropic	Anthropic API	Claude models, streaming, tool use
stripe	pip install stripe	Payment processing	Charges, subscriptions, webhooks
twilio	pip install twilio	Communications	SMS, voice, video, WhatsApp
sendgrid	pip install sendgrid	Email sending	Transactional emails, templates, tracking
pygithub	pip install pygithub	GitHub API	Repos, issues, PRs, webhooks

Quick Install Commands by Use Case

Web Development Stack:

```
pip install flask sqlalchemy requests python-dotenv
```

Data Science Stack:

```
pip install numpy pandas matplotlib seaborn scikit-learn jupyter
```

Web Scraping Stack:

```
pip install requests beautifulsoup4 selenium pandas
```

Testing Stack:

```
pip install pytest coverage black flake8 mypy
```

API Development Stack:

```
pip install fastapi uvicorn pydantic sqlalchemy python-jose
```

CLI Tools Stack:

```
pip install click rich tqdm python-dotenv
```

Machine Learning Stack:

```
pip install tensorflow pytorch scikit-learn transformers
```

DevOps Stack:

```
pip install boto3 docker kubernetes fabric ansible
```

Pro Tips

- 1. Use virtual environments:** `python -m venv venv` to isolate dependencies
- 2. Pin versions:** Use `pip freeze > requirements.txt` for reproducibility
- 3. Update packages:** `pip install --upgrade package-name`
- 4. List installed:** `pip list` or `pip freeze`
- 5. Show package info:** `pip show package-name`
- 6. Uninstall:** `pip uninstall package-name`
- 7. Install from requirements:** `pip install -r requirements.txt`
- 8. Use pip-tools:** For better dependency management with `pip-compile`
- 9. Check for updates:** `pip list --outdated`

10. **Install specific version:** pip install package==1.2.3