🎓 University Management System API

This is a Flask-based REST API project for accessing university departments, students, and courses data from a PostgreSQL database.
It provides easy-to-use endpoints, Swagger API documentation, and a modern web interface for testing.

🚀 Features

- RESTful API GET endpoints for:
  - **Departments** with instructor details
  - **Students** with course enrollment details
  - **Courses** with instructor teaching details
- **Swagger API Documentation** (`Flasgger` powered)
- **PostgreSQL database** integration
- **Responsive Web Interface** (HTML/CSS)
- Modular code structure using Flask **Blueprints**
- Pagination support for all APIs
- **CORS** support enabled for cross-origin access

📦 Prerequisites

- Python 3.x
- PostgreSQL database (with university data loaded)
- `pip` package manager

🛠️ Installation

1. **Clone the repository:**

```
git clone <repository-url>
cd <project-directory>
```

2. **Create and activate a virtual environment:**

```
python -m venv venv
source venv/bin/activate  # On Windows: venv\Scripts\activate
```

3. **Install dependencies:**

```
pip install -r requirements.txt
```

4. **Configure the database connection:**
    - Update your `db.py` file with correct PostgreSQL credentials (host, port, username, password, database name).

📁 Project Structure

```
.
├── app.py                # Main Flask app
├── db.py                 # PostgreSQL connection setup
├── requirements.txt      # Python dependencies
├── routes/               # API route handlers
│   ├── departments.py
│   ├── students.py
│   └── courses.py
└── webpage/              # Static web portal
    └── index.html
```

▶ Running the Application

1. **Start the Flask server:**

```
python app.py
```

2. **Access the endpoints:**
    - Web Portal: http://127.0.0.1:5000
    - Swagger API Documentation: http://127.0.0.1:5000/apidocs/

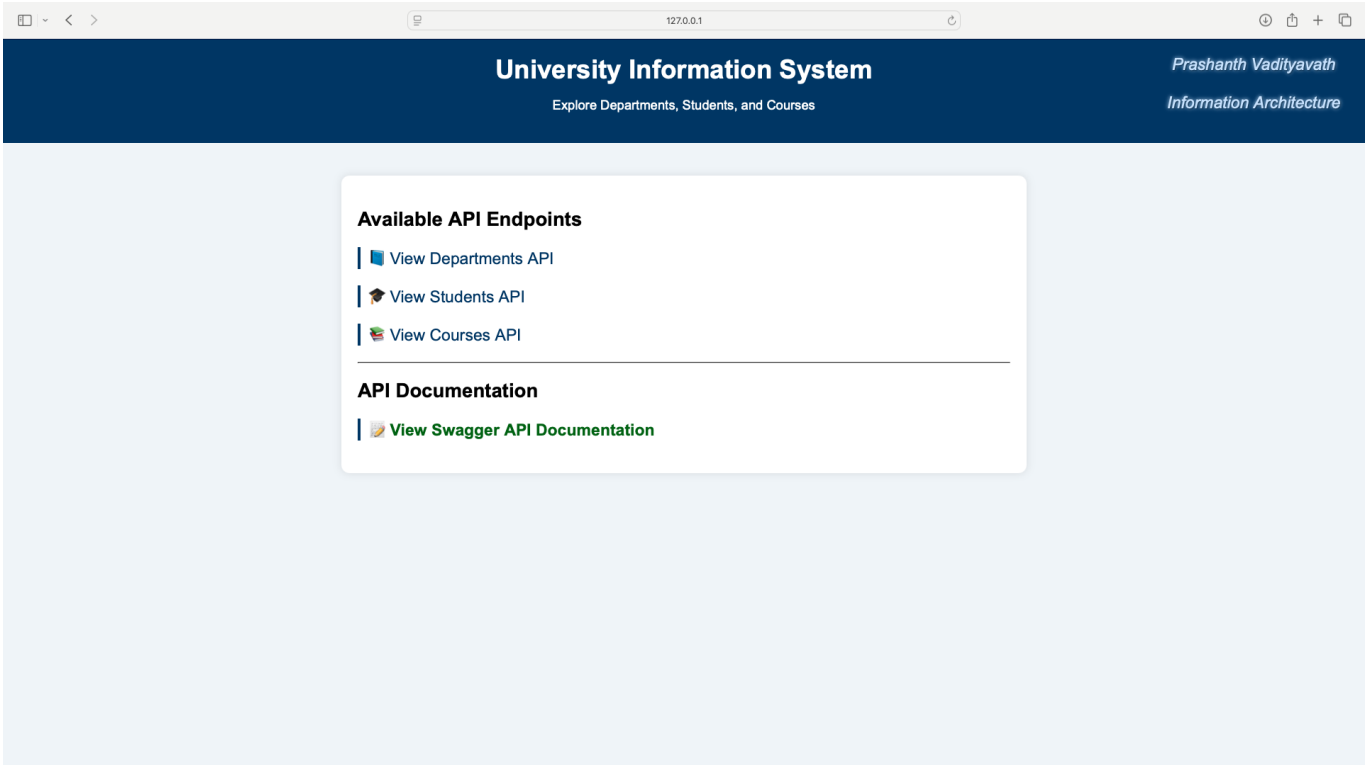
🔥 Web Interface

The web interface provides:

- **University Portal Theme** 🎓
- Quick links to:
    - Departments API
    - Students API
    - Courses API
- Embedded Swagger API documentation

🖼️ Screenshots

1. Main University Portal



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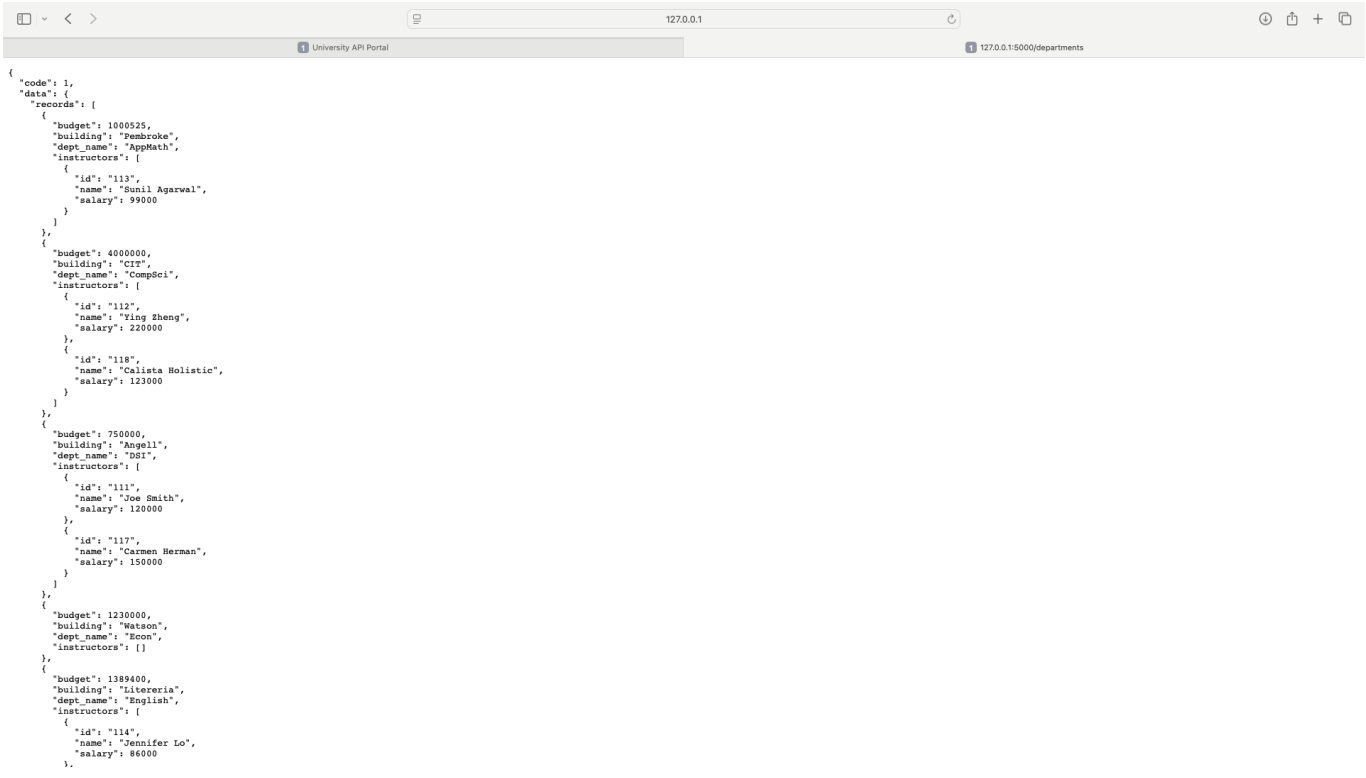
2. Departments API Response



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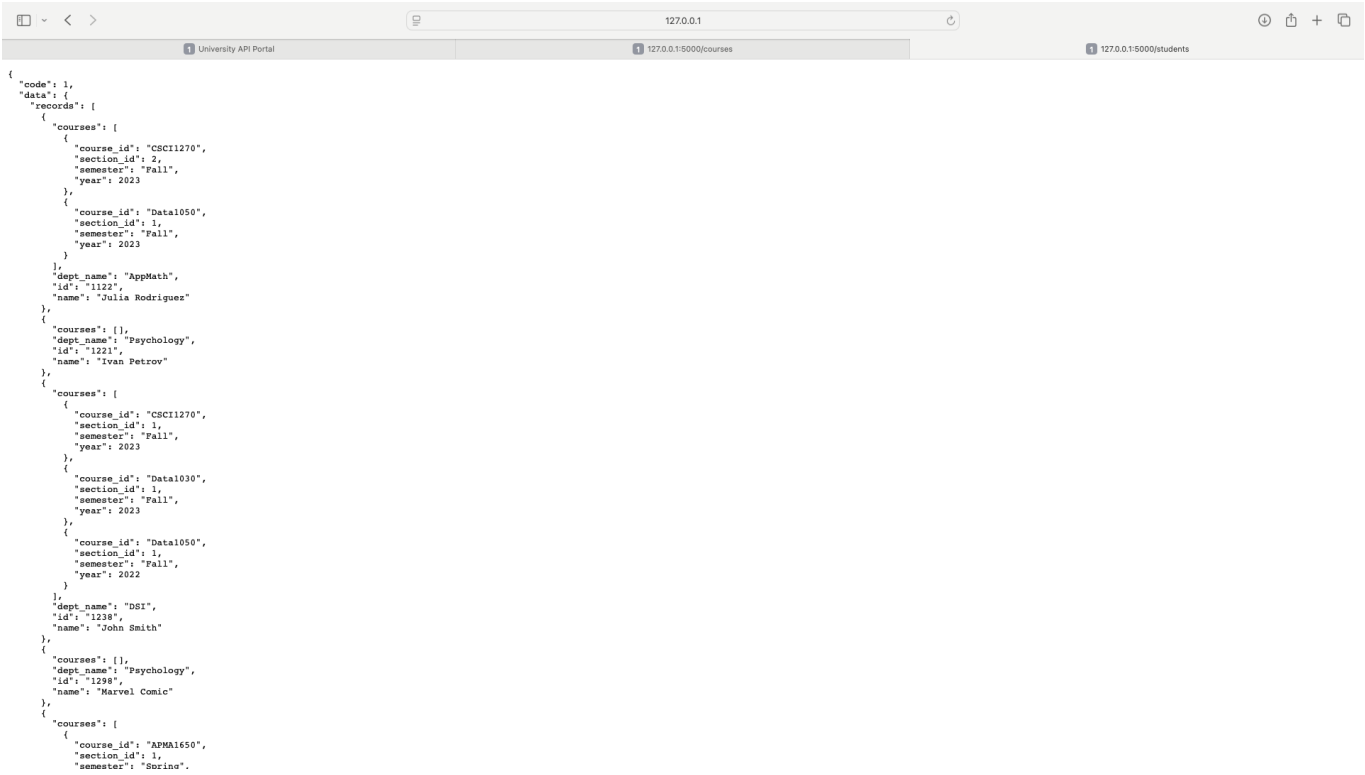
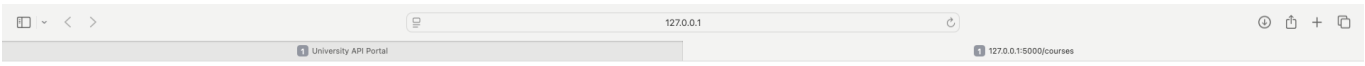
3. Students API Response



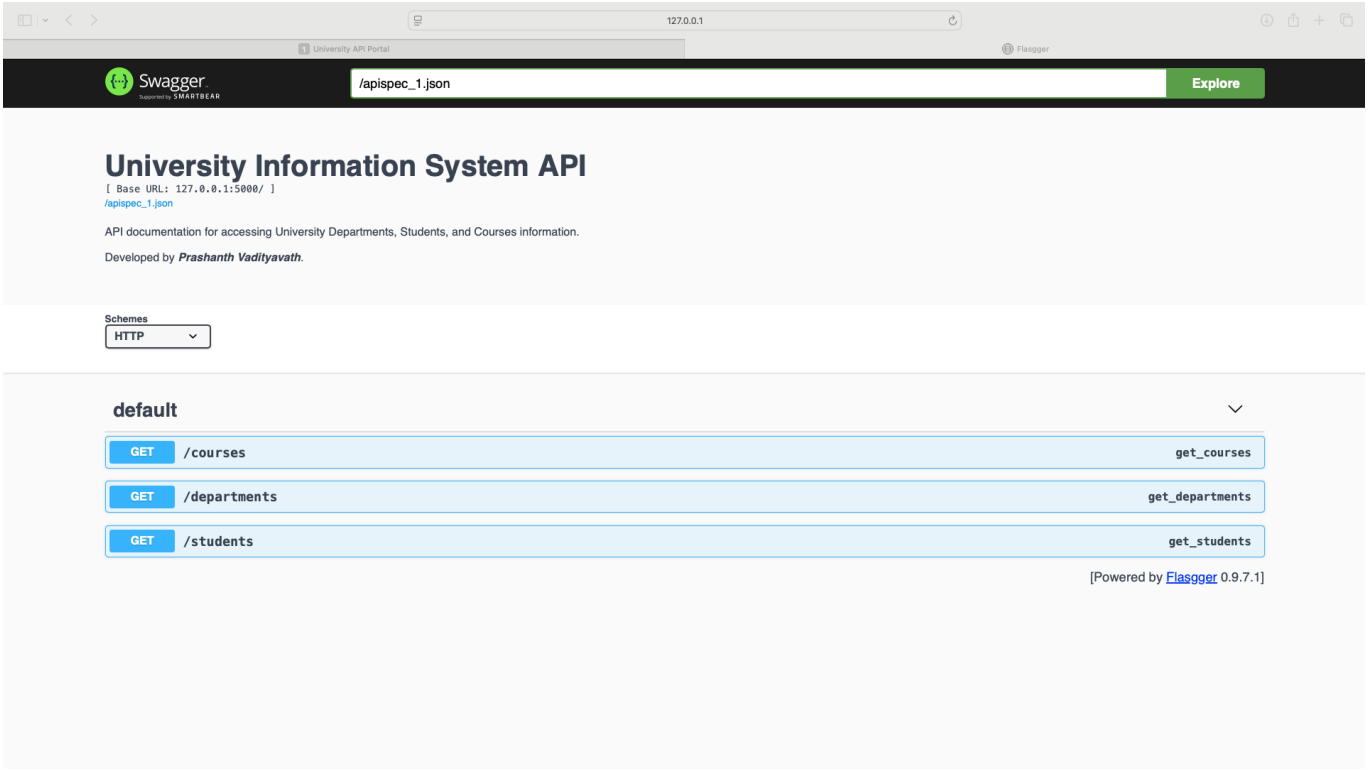

```
{
  "code": 1,
  "data": {
    "records": [
      {
        "courses": [
          {
            "course_id": "CSCI1270",
            "section_id": 2,
            "semester": "Fall",
            "year": 2023
          },
          {
            "course_id": "Data1050",
            "section_id": 1,
            "semester": "Fall",
            "year": 2023
          }
        ],
        "dept_name": "AppMath",
        "id": "1122",
        "name": "Julia Rodriguez"
      },
      {
        "courses": [],
        "dept_name": "Psychology",
        "id": "1221",
        "name": "Ivan Petrov"
      },
      {
        "courses": [
          {
            "course_id": "CSCI1270",
            "section_id": 1,
            "semester": "Fall",
            "year": 2023
          },
          {
            "course_id": "Data1030",
            "section_id": 1,
            "semester": "Fall",
            "year": 2023
          },
          {
            "course_id": "Data1050",
            "section_id": 1,
            "semester": "Fall",
            "year": 2022
          }
        ],
        "dept_name": "DSI",
        "id": "1238",
        "name": "John Smith"
      },
      {
        "courses": [],
        "dept_name": "Psychology",
        "id": "1298",
        "name": "Marvel Comic"
      },
      {
        "courses": [
          {
            "course_id": "APMA1650",
            "section_id": 1,
            "semester": "Spring".
```

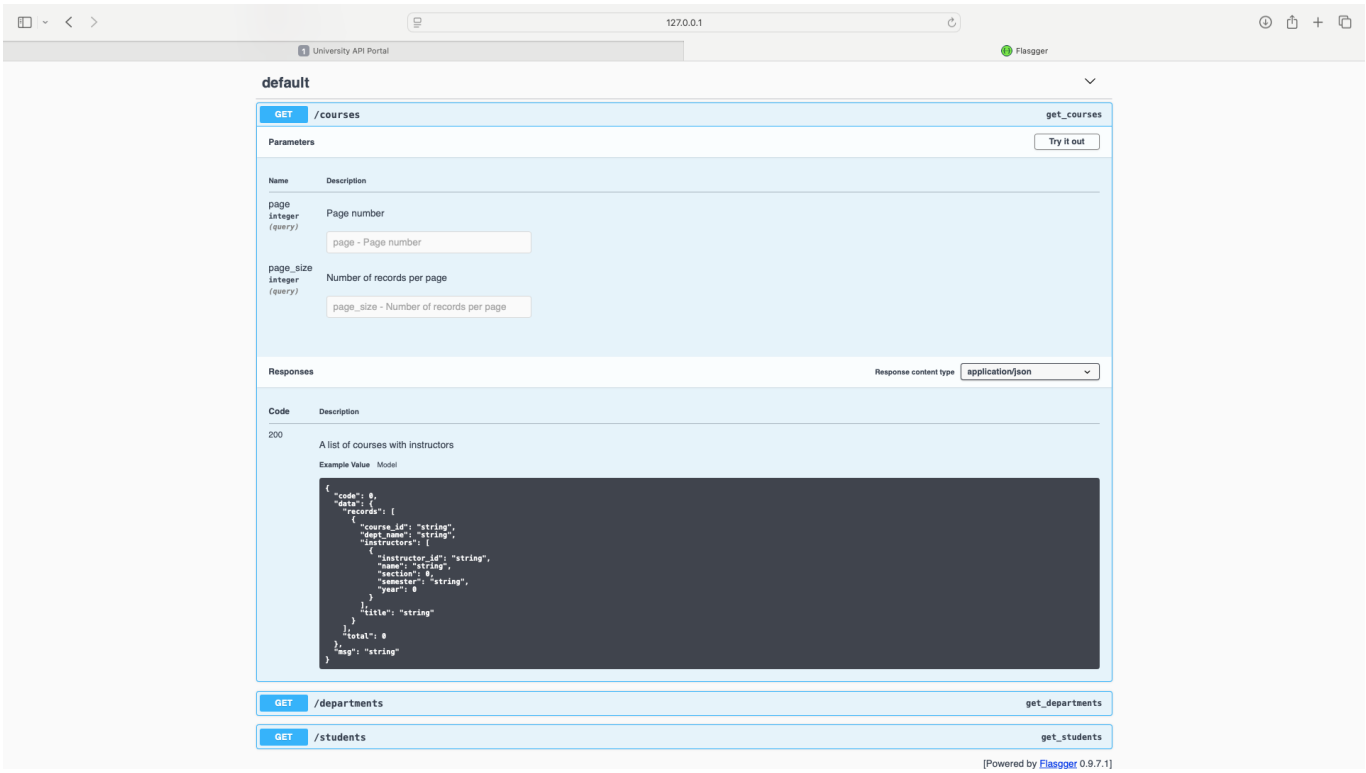

4. Courses API Response

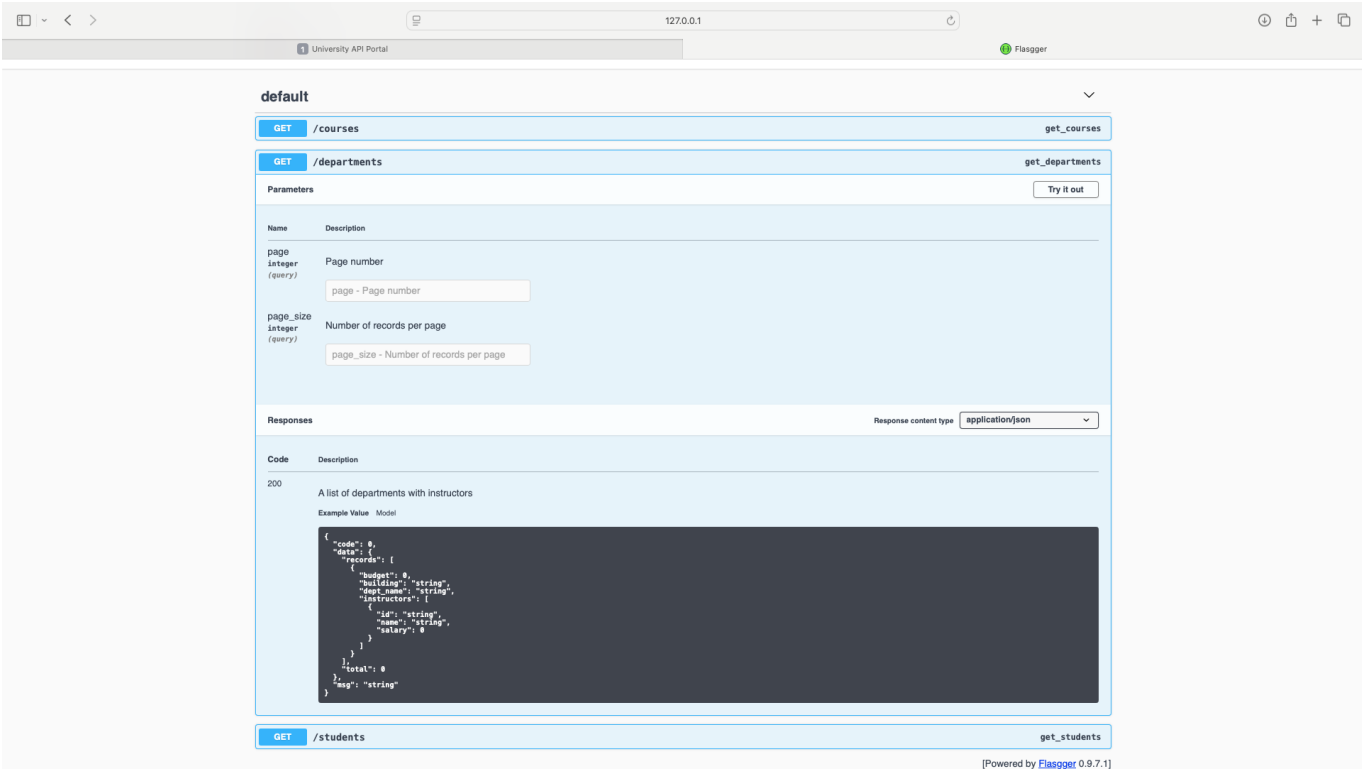


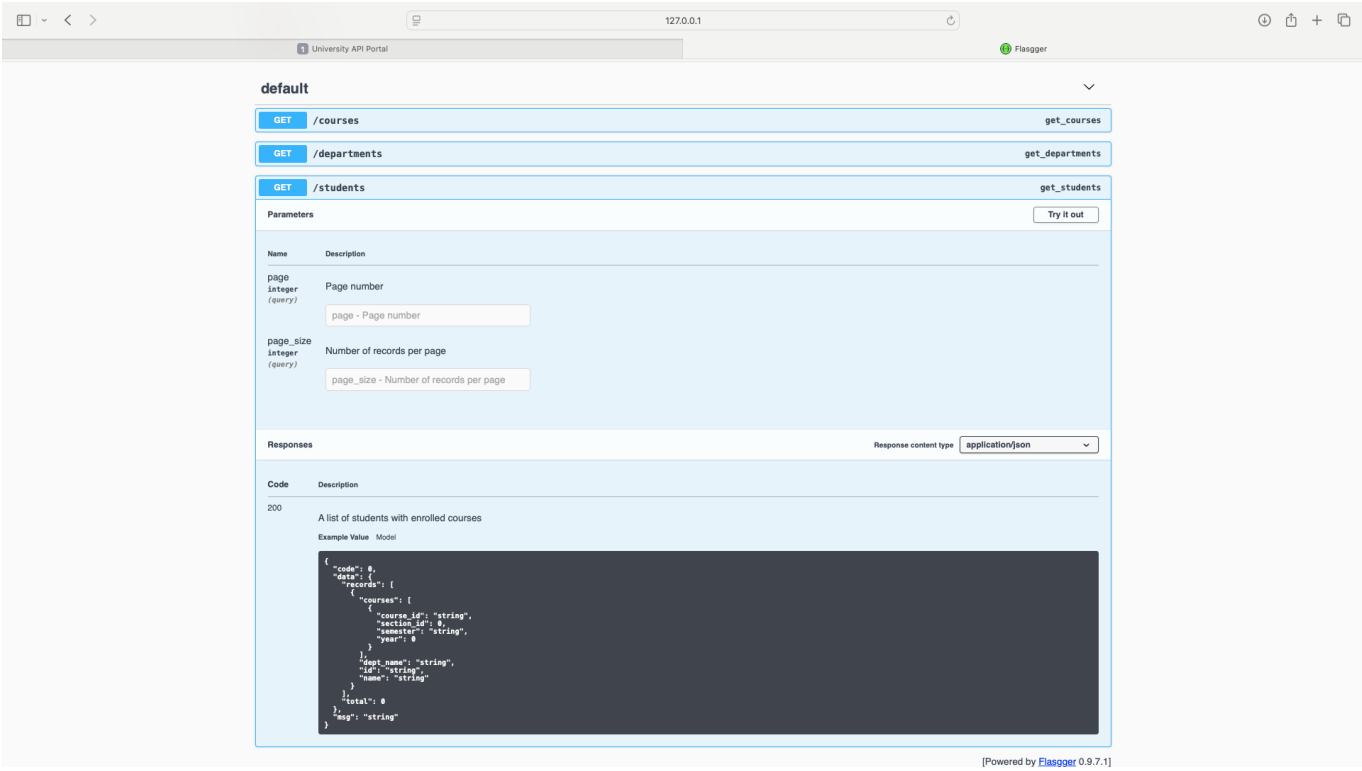

```
{
  "code": 1,
  "data": {
    "records": [
      {
        "course_id": "APMA1650",
        "dept_name": "AppMath",
        "instructors": [
          {
            "instructor_id": "113",
            "name": "Sunil Agarwal",
            "section": 1,
            "semester": "Spring",
            "year": 2023
          }
        ],
        "title": "Statistical Inference 1"
      },
      {
        "course_id": "CSCI1270",
        "dept_name": "CompSci",
        "instructors": [
          {
            "instructor_id": "112",
            "name": "Ying Zheng",
            "section": 1,
            "semester": "Fall",
            "year": 2023
          },
          {
            "instructor_id": "118",
            "name": "Calista Holistic",
            "section": 2,
            "semester": "Fall",
            "year": 2023
          }
        ],
        "title": "Database Management Systems"
      },
      {
        "course_id": "Data1030",
        "dept_name": "DSI",
        "instructors": [
          {
            "instructor_id": "117",
            "name": "Carmen Herman",
            "section": 1,
            "semester": "Fall",
            "year": 2023
          }
        ],
        "title": "Hands-on data science"
      },
      {
        "course_id": "Data1050",
        "dept_name": "DSI",
        "instructors": [
          {
            "instructor_id": "111",
            "name": "Joe Smith",
            "section": 1,
            "semester": "Fall",
            "year": 2023
          },
          {
            "instructor_id": "117".
```


5. Swagger API Documentation Interface


127.0.0.1
University API Portal
Flasgger
Swagger
Supported by SMARTBEAR
/apispec_1.json
Explore
University Information System API
[Base URL: 127.0.0.1:5000/]
/apispec_1.json
API documentation for accessing University Departments, Students, and Courses information.
Developed by Prashanth Vadityavath.
Schemes
HTTP
default
GET /courses get_courses
GET /departments get_departments
GET /students get_students
[Powered by Flasgger 0.9.7.1]


127.0.0.1
University API Portal
Flasgger
default
GET /courses get_courses
Parameters
Try it out
Name
Description
page
integer
(query)
Page number
page - Page number
page_size
integer
(query)
Number of records per page
page_size - Number of records per page
Responses
Response content type
application/json
Code
Description
200
A list of courses with instructors
Example Value
Model
{
"code": 0,
"data": {
"records": [
{
"course_id": "string",
"dept_name": "string",
"instructors": [
{
"instructor_id": "string",
"name": "string",
"section": 0,
"semester": "string",
"year": 0
}
],
"title": "string"
}
],
"total": 0
},
"msg": "string"
}
GET /departments get_departments
GET /students get_students
[Powered by Flasgger 0.9.7.1]





📚 API Endpoints

All APIs support **pagination** via:

- `page` (default = 1)
- `page_size` (default = 10)

Common JSON response structure:

```
{
  "code": 1,
  "msg": "Success",
  "data": {
    "records": [],
    "total": 0
  }
}
```

🧬 Departments

- **Endpoint:** `/departments`
- **Returns:** List of departments and associated instructors.

👩‍🎓 Students

- **Endpoint:** `/students`
- **Returns:** List of students and enrolled courses.

📚 Courses

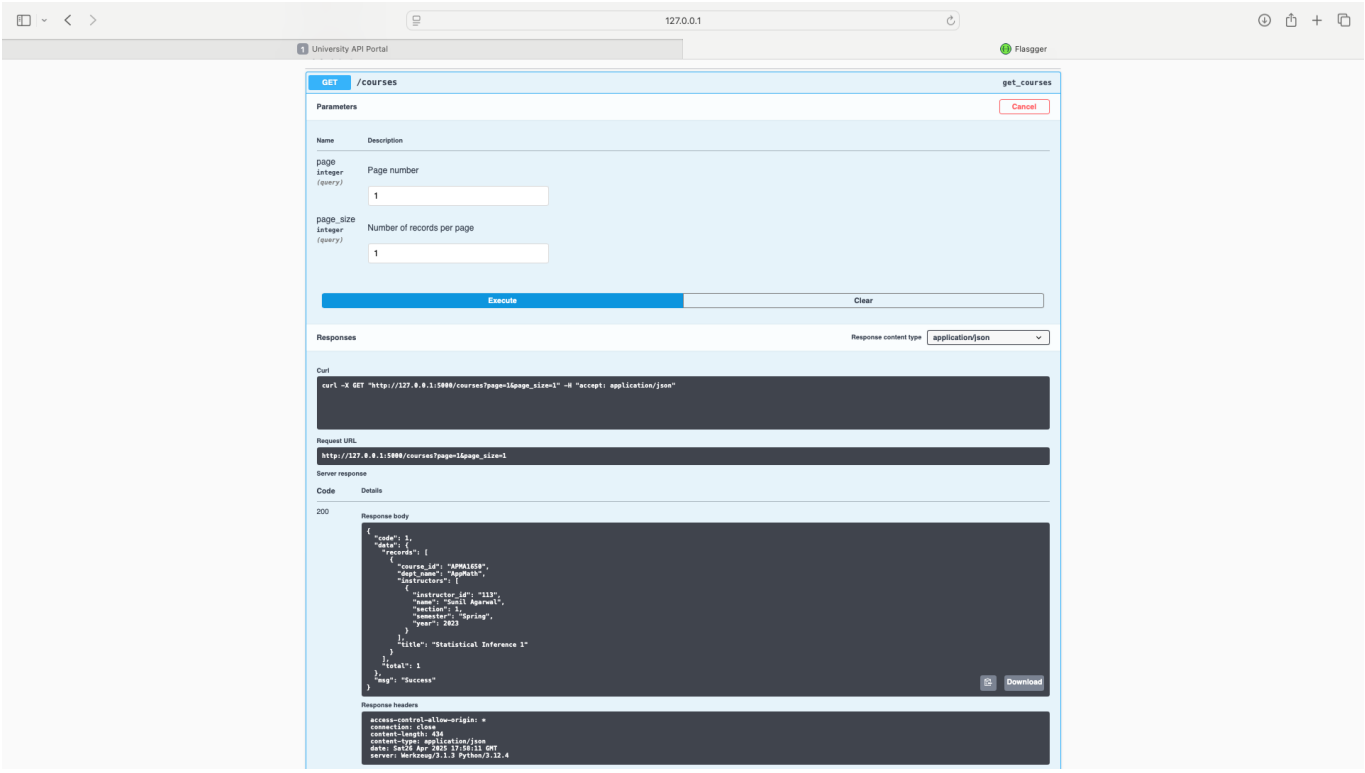
- **Endpoint:** `/courses`
- **Returns:** List of courses and teaching instructors.

⚙️ Dependencies

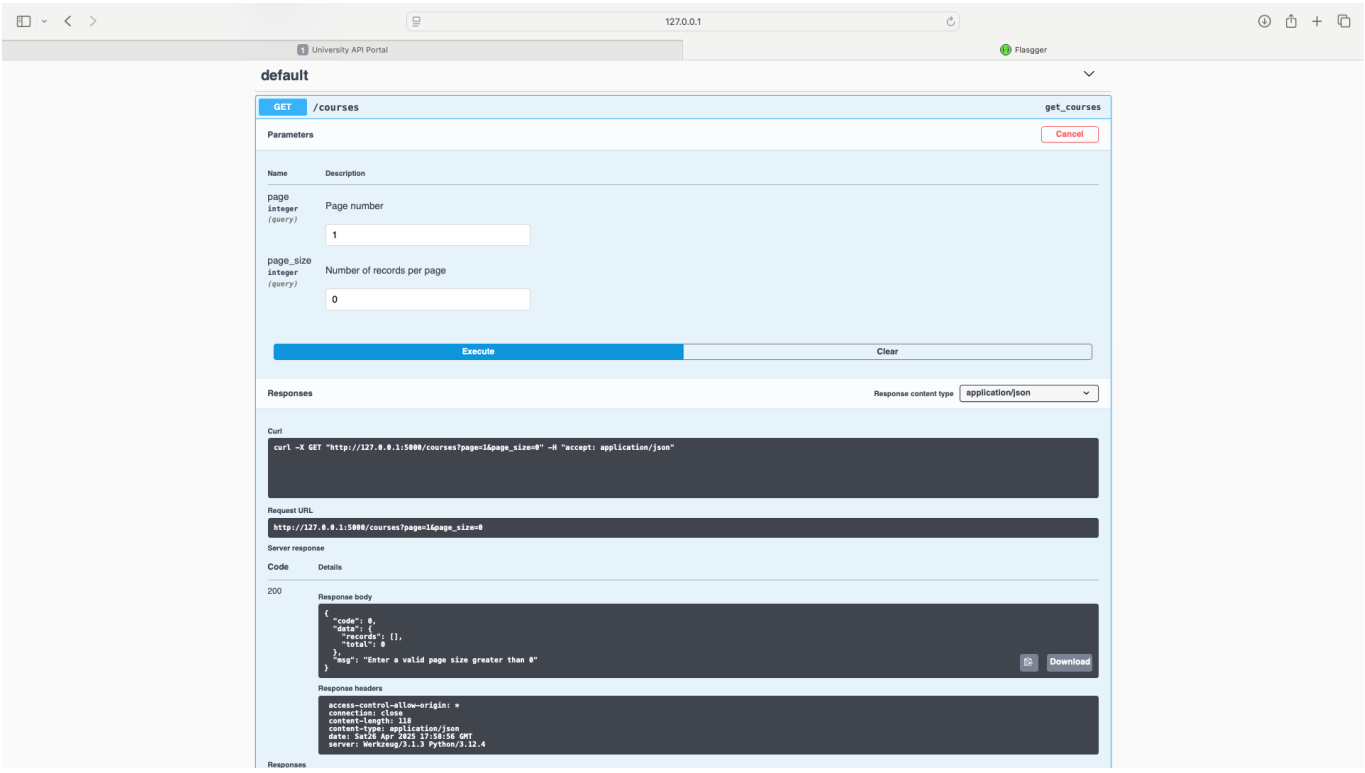
- **Flask** - Web framework
- **Flasgger** - Swagger API Documentation
- **Flask-RESTX** - API abstraction layer (optional)
- **Flask-CORS** - Cross-Origin Resource Sharing
- **psycopg2** - PostgreSQL Adapter for Python

🧪 API Testing Scenarios (Swagger Testing)

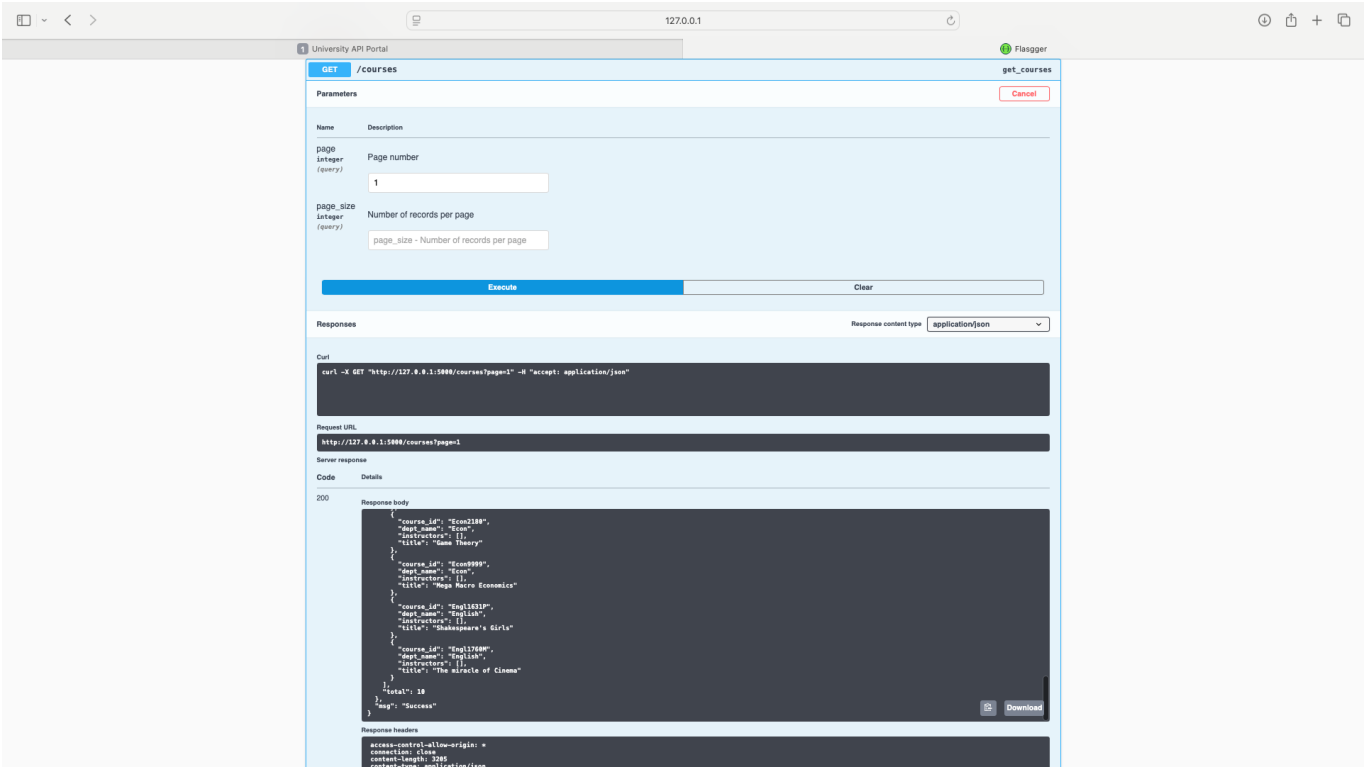
Test No.	Input (Page, Page Size)	Expected Behavior	Status
1	Page = 1, Page Size = 1	Successfully fetch 1 record	✅ Passed



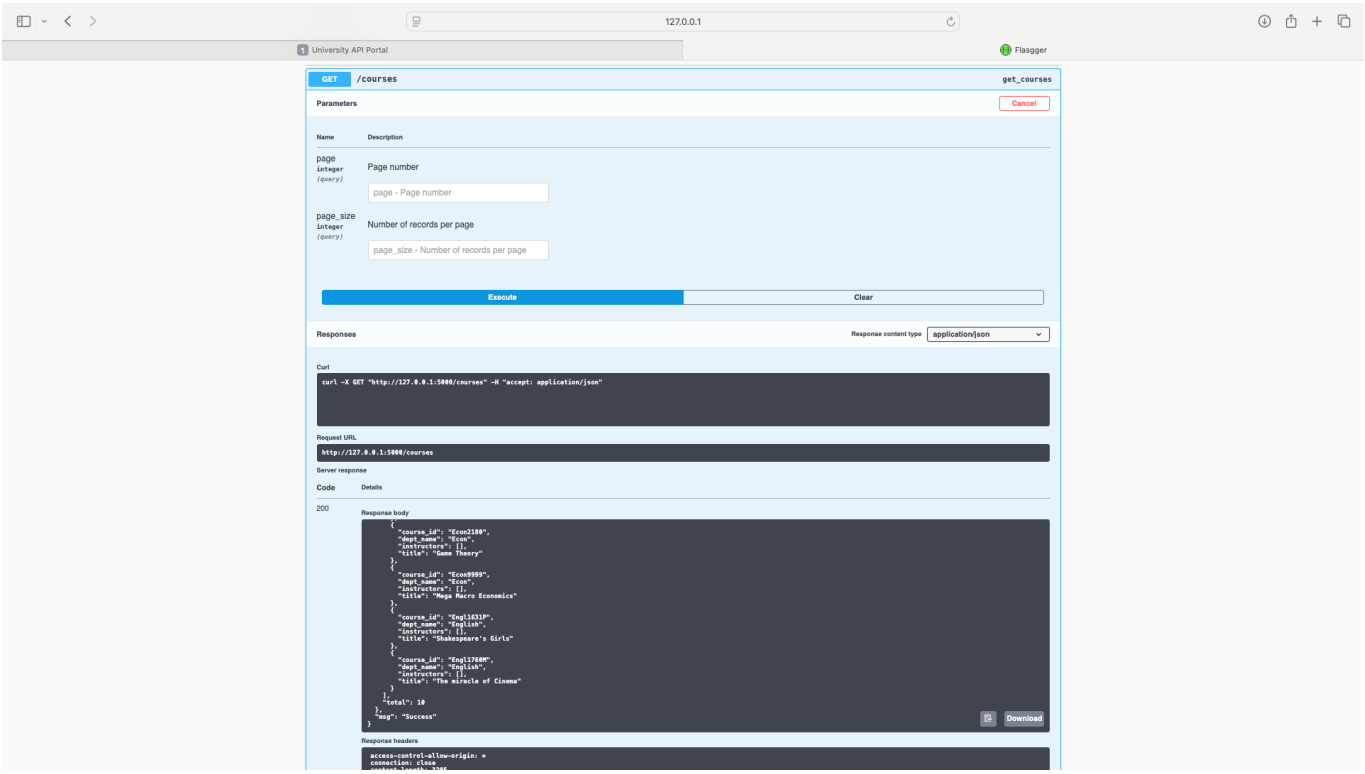
Test No.	Input (Page, Page Size)	Expected Behavior	Status
2	Page = 1, Page Size = 0	Error: "Enter a valid page size greater than 0"	✅ Passed



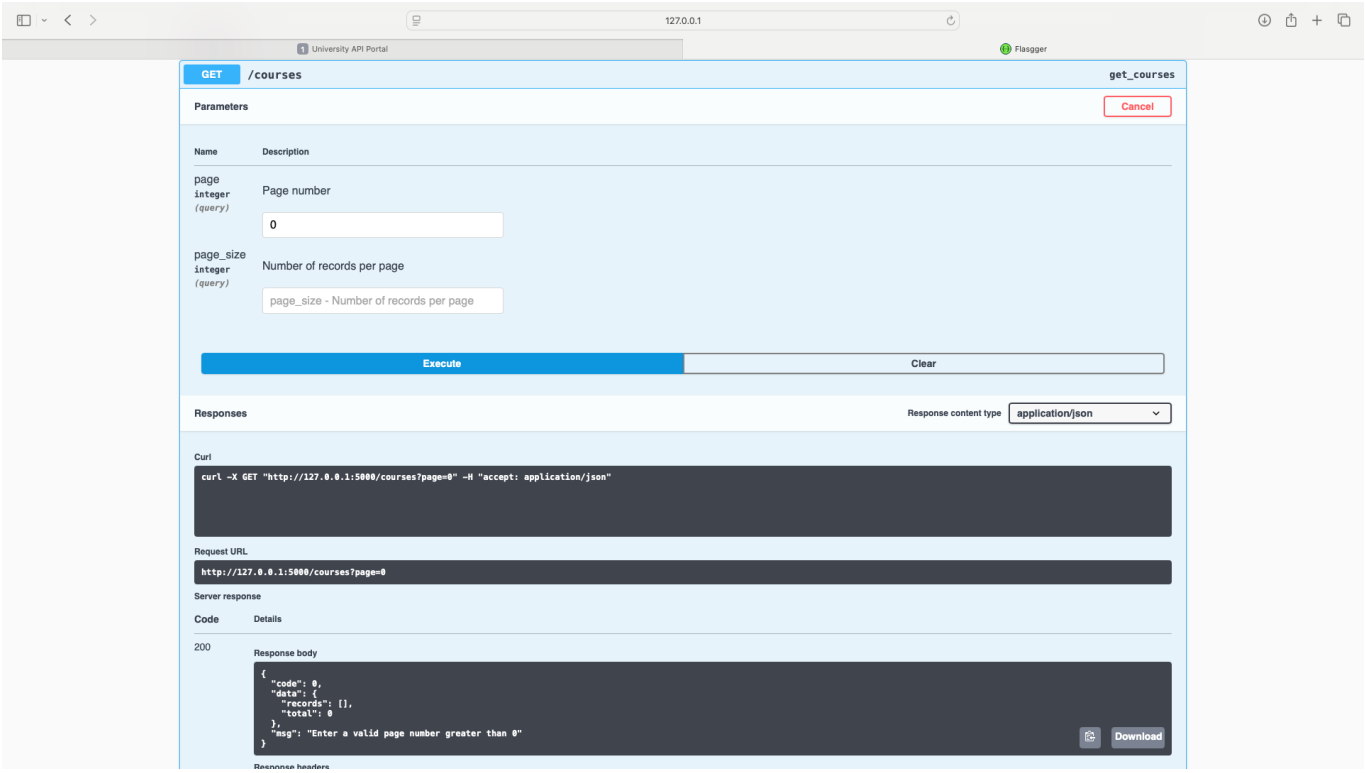
Test No.	Input (Page, Page Size)	Expected Behavior	Status
3	Page = 1, Page Size = (empty)	Defaults to page_size = 10	✅ Passed



Test No.	Input (Page, Page Size)	Expected Behavior	Status
4	Page = (empty), Page Size = (empty)	Defaults to page = 1, page_size = 10	✅ Passed



Test No.	Input (Page, Page Size)	Expected Behavior	Status
5	Page = 0, Page Size = (empty)	Error: "Enter a valid page number greater than 0"	✅ Passed



👨‍💻 Developed by

Prashanth Vadityavath
