



# Arizona State University Gym Crowdedness Analytics

## Executive Operations Insight & Optimization Report

Prepared By: Mohamed Fouad

Position: Data Analyst

### Executive Summary

This report analyzes 477,023 recorded gym visits across time, seasonal, academic, and environmental dimensions to transform attendance data into actionable operational insights. The objective is to optimize staffing allocation, improve facility utilization, and enhance overall student experience through data-driven planning. The analysis supports data-driven operational planning within a non-profit institutional environment.

### Key Operational Insights

- **Hourly Utilization:** Peak congestion occurs between 9 AM and 11 AM, with 11 AM recording the highest traffic 101,089 visits. Peak congestion consistently occurs between 9 AM and 11 AM, identifying mid-morning as the highest operational load window.
- **Weekly Pattern:** Tuesday 79,633 visits and Wednesday 79,070 visits are the busiest days. Weekend attendance 98,669 total visits compared to 378,354 visits on weekdays. Attendance remains consistent from Monday to Friday, with noticeable reductions on Saturday and Sunday.
- **Monthly Trend:** September recorded the highest attendance 72,473 visits, while June recorded the lowest 19,284 visits. Strong growth begins in August 45,014 visits and peaks in early Fall . Stable attendance from January to March, followed by a decline from April to July. A strong increase begins in August, peaking in September, with slight normalization toward December.
- **Quarterly Distribution:** Q4 records the highest attendance levels, followed by Q3. Q1 shows moderate activity, while Q2 records the lowest facility utilization.
- **Seasonal Effect:** Fall leads with 189,149 visits, followed by Winter 113,152 visits, Spring 88,099 visits, and Summer 86,623 visits. Fall significantly outperforms all other seasons in attendance. Winter follows, while Spring and Summer show similar but slightly lower levels.

- Year-over-Year Change: 2015 recorded 150,916 visits, increasing significantly in 2016 to 305,982 visits (increased 155,066 visits). 2017 shows 20,125 visits (decreased 75,000 visits) from expected (partial-year data).
- Semester & Holiday Impact: Attendance is highest during academic semesters 378,556 visits, particularly on non-weekend days. versus 98,467 visits outside semesters. The combination of non-semester periods and weekends shows the lowest usage levels.
- Temperature Relationship: Peak attendance occurs between 55°F and 65°F, with significant spikes around 60°F. Attendance drops sharply above 75°F. Attendance increases during colder temperatures, stabilizes during moderate conditions, and decreases significantly during extreme heat.
- Holiday Effect: Only 170 visits occurred on holidays, confirming minimal operational demand

### **Operational Implications**

The findings highlight predictable congestion windows and underutilized periods. Peak-hour strain may impact equipment availability, staff responsiveness, and student satisfaction. Conversely, off-peak periods represent opportunities to redistribute usage and improve overall facility balance. The sharp decline observed in 2017 warrants further operational investigation to identify engagement or structural drivers.

### **Operational Recommendations**

- Staff Optimization: Increase staffing coverage between 9 AM and 11 AM, particularly during Fall and active semester periods.
- Capacity Redistribution: Introduce structured off-peak engagement initiatives such as powerlifting competitions, fitness challenges, or themed workout events with symbolic prizes to encourage attendance during low-traffic hours.
- Semester-Based Planning: Align facility scheduling, maintenance windows, and program offerings with academic calendar trends.
- Weekend Engagement Strategy: Organize weekend-specific group activities, workshops, or small tournaments to improve utilization.
- Heat Mitigation Approach: During extreme temperature periods, promote indoor fitness programs and awareness campaigns emphasizing climate-controlled training benefits.

- Root-Cause Review for 2017 Decline: Conduct deeper operational analysis to evaluate external factors, academic policy shifts, or facility changes that may have influenced attendance.

## **5. Expected Operational Impact**

Implementation of these recommendations is expected to improve workload distribution, reduce peak-hour congestion, enhance student experience, and support sustainable facility operations. By leveraging structured attendance insights, the institution can transition from reactive adjustments to proactive operational planning.

## **Conclusion**

This analysis demonstrates how structured data analytics can enhance operational decision-making within a university environment. The value lies not in commercial gain, but in improved service quality, resource optimization, and institutional effectiveness. Data-driven operational insight ensures that facilities function efficiently while supporting student wellbeing and engagement.